

# **Report of the Working Group**

for the

## **Eleventh Five Year Plan (2007-12)**

on

*Crop Husbandry,  
Agricultural Inputs,  
Demand and Supply Projections and  
Agricultural Statistics*

**Chairman: Prof. V. S. Vyas**

**Member Secretary: Dr. Rajiv Mehta**

**Planning Commission**  
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## ***Acknowledgments***

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*The Working Group is also thankful to Dr. Bhagwan Das, Economic Officer, Shri P.K. Srivastava, Senior Statistical Officer and Shri D.N. Sharma, Stenographer (Grade-II) of the Commission for Agricultural Costs and Prices for their documentation and secretariat support.*

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December 2, 2006

**Letter of Transmittal**

Dear Dr. Sen,

It is now widely recognized that accelerating rate of growth of agriculture production is important for attaining the overall growth of the economy. More importantly, it is necessary to ensure a reasonable standard of living for a large workforce engaged in this sector and to ensure food security in the country. At the same time, it is a daunting task if one takes into account the record of growth in this sector during last few years. Several corrective measures have to be taken in the areas of economic policy, public investment and technology development. The Approach Paper to 11th Plan has made all these abundantly clear. It is however, important to spell out the strategies as well as contents of the programmes to achieve the desired results. The **Working Group on Crop Husbandry, Agriculture Inputs, Demand and Supply Projection and, Agricultural Statistics** was entrusted with this task as a part of the preparations for the formulation of 11th Five Year Plan.

The Group in its report spells out the conditions for agricultural growth and suggests measures in key areas for imparting dynamism to this sector. In our view, with determined efforts it should be possible to meet the targets of agricultural growth postulated in the Approach Paper. The tasks are not simple as internal as well as external environment have become more complex, and yet the challenge has to be accepted without any compromise. We have spelled out the nature of activities to be undertaken in certain key areas, and have also recognized the need for action in several other related areas.

The group benefited by inputs from knowledgeable members. But the most important task of collating these views and putting them in a logical framework fell on the Member-Secretary Dr. Rajiv Mehta which he undertook cheerfully and diligently. I have also to thank my colleagues on the Working Group, especially those who shouldered the responsibilities of preparing reports of the three sub-groups in which we had divided our work. We are also grateful to you, Sir, and to your colleagues in the Planning Commission for all the help and support.

I do hope that this report will be of help in formulating the 11th Plan for the critical sector of Agriculture.

With regards,

Yours sincerely,



[V.S. Vyas]

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**Report of the Working Group on  
Crop Husbandry, Agricultural Inputs, Demand and Supply  
Projections and Agricultural Statistics  
for the Eleventh Five Year Plan (2007-12)**

**Executive Summary**

1. *The Planning Commission constituted the Working Group on Crop Husbandry, Agricultural Inputs, Demand and Supply projections and Agricultural statistics for the 11<sup>th</sup> Five Year Plan (2007-12) under the Chairmanship of Prof. V.S. Vyas. The Working Group was assigned 13 Terms of References in 3 broad sub-heads : Crop Husbandry and Inputs, Demand and Supply Projections and Agricultural Statistics.*

*(Chapter-1)*
2. *The Working Group oriented itself with the perspective of 11<sup>th</sup> Five Year Plan as outlined in the approach paper, giving a vision for the accelerated growth of the economy including that for the agriculture and the rural economy. The central theme of the approach paper is to restructure policies for achieving accelerated, broad based and inclusive growth, aiming to faster reduction in poverty and helping to bridge the divide in the economic conditions amongst different segments of population. The vision for 11<sup>th</sup> Plan aims to achieve 9 per cent per annum overall economic growth and growth at 4.1 per cent per annum for agriculture and allied sector (Crop Husbandry, Horticulture, Livestock, Fisheries, Forestry and Logging). This amounts to doubling the achievements of the 9<sup>th</sup> and the 10<sup>th</sup> Plan in agricultural sector.*

*(Chapter-2)*
3. *In the context of the 11<sup>th</sup> Plan vision, the Working Group was given the responsibility of assessment of feasibility and desirability of achieving accelerated growth. Accordingly, the critical issues of supply as well as demand side were identified. These issues inter-alia related to deceleration of agricultural growth particularly in the crop husbandry segment where the growth of production supply turned out to be lower than the population growth, mismatch between demand and supply causing price depression and resultant decline in farm profitability threatening food and livelihood security. The weak supply co-existed with weak demand, despite relatively*

*faster growth of economy during 10<sup>th</sup> Plan plausibly due to concentration of growth in select urban pockets and its weak diffusion over larger segments of population. However, the approach paper is optimistic about stimulation of demand because of various policy interventions and the prospects of faster, inclusive and broad based growth.*

*(Chapter-2)*

- 4. The Working Group identified critical supply side and institutional issues such as absence of significant technology breakthrough, the constraints in seed sector, weaknesses in delivery system, prevalence of knowledge deficit at farmers end, institutional issues related to credit, extension, marketing and risk management and consequences of global trade uncertainties. The issues relating to investment in agriculture, agrarian distress, preponderance and marginal farmers and macro and micro food security are also identified to be addressed for the holistic and sustainable growth, not only that of agriculture but for entirety of rural economy.*

*(Chapter-3)*

- 5. The prime concern revealed by the review of agriculture in the past decade is the loss of growth rhythm in crop husbandry sector that was build up during the green revolution and had helped the sustained food security in the decades of eighties and nineties. After leading the economy with the impressive growth of 5.7% per annum during the 6<sup>th</sup> plan (1980-81 to 1984-85), the slackening trend of agriculture growth had set in. During the 9<sup>th</sup> and 10<sup>th</sup> Plan the growth was modest 2%. In contrast the economic reforms initiated in the nineties yielded accelerated growth of non-agriculture sector. As a result the economic gap between agriculture and non-agriculture gradually widened and in 2005-06 the share of agriculture in the total economy had fallen below 20%. The slow agricultural growth begun during the last decade and is continuing since then. Against this background, the envisaged growth of 4% during 11<sup>th</sup> Plan would necessitate special efforts for reversing the current trend of growth deceleration.*

- 6. The economic contribution of several post harvest initiatives such as trade, processing, packaging and such related activities in the periphery of agriculture that had been the thrust areas of agrarian reforms for a diversified agricultural growth are not captured as GDP share of agriculture and allied activities in the National Accounts. These peripheral activities are of particular significance for a broad based, diversified growth of rural economy.*

*(Chapter-4)*

7. The slackening growth in the past decade, covering the periods of 9<sup>th</sup> and 10<sup>th</sup> Plan, was manifested into subdued production response particularly that of foodgrains. The foodgrain production at the onset of 11<sup>th</sup> Plan is likely to be same as that was at the onset of 10<sup>th</sup> Plan (212.9 million tonnes in 2001-02) and is likely to miss the 10<sup>th</sup> Plan target of 230 million tonnes by wide margin. The production of pulses during the plan period hovered around 14 million tonnes, a level consistent over the decades. The silver lining of the performance during 10th Plan was in oilseeds and cotton, the production of these crops had been impressive with record output of 27.73 million tonnes and 19.57 million bales respectively during 2005-06.

(Chapter-4)

8. During the period 1995-96 to 2004-05, the constraints of land availability for agriculture due to competing pressure of non-agriculture sector and rapid urbanization was witnessed in declining trend of acreage for most of the crops. The net sown area of 140 million hectares, and the gross cropped area of 190 million hectares, has virtually stagnated. Besides, the sharp decline in the growth of productivity except in case of cotton and maize indicated the absence of technological breakthrough reaching at farmers' end.

(Chapter-4)

9. The inert performance of agriculture was also a fallout of more frequent aberrations in agro-climatic conditions during this period, stagnation in irrigated area, inadequate response of cropping intensity in irrigated agriculture, weakening production response to inputs, particularly the response to fertilizer use and missing links in the seed production and distribution system.

(Chapter-5)

10. Therefore, actualization of the vision of 4% growth will necessitate formulation of strategies and programmes taking into account (a) identification of causes for growth deceleration, (b) appropriate measures to address the factors retarding the growth and stemming the slide in the performance of production and productivity and (c) restoring the growth trajectory of the agriculture, not only to fulfil the vision of 11<sup>th</sup> Plan but for a long term sustainable growth beyond 11<sup>th</sup> Plan.

(Chapter-5)

11. The key factors continuing to the decelerated agricultural growth can be identified as follows :

- Stressed natural endowments,
- Capital stock depletion and inadequate investment supplementation,
- Fatigue in production response to application of various inputs,
- Declining resource use efficiency
- Persisting technology gap and knowledge deficit in agriculture.
- Weakness of the supporting institutions of research, extension, credit and marketing, and
- Inadequate risk mitigation measures

(Chapter-5)

12. Though the growth deceleration in agriculture is not uniform and there are regions holding promise, country is certainly not comfortably endowed with land resources to facilitate substantial horizontal expansion of crop area. Besides the sharp erosion of total factor productivity in agriculture is on account of multiple factor relating to technology fatigue, soil fatigue, declining fertilizer response rate depleting water resources, irrigation potential and capital stock and agro-climatic aberrations. For sustaining the growth, these impediments should be addressed during the 11<sup>th</sup> Plan. To address these critical issues, the input management would require focused attention on five core areas viz. seeds, nutritional management, water management, management of chemicals and energy.

(Chapter-5)

13. Development of improved seed varieties and their availability to farmers had been instrumental in stimulating agricultural growth in the past. The momentum of technology of seeds development and upgradation, covering infrastructure, scientific expertise need to be sustained, reenergized and reoriented more vigorously for actualizing the potential of agricultural growth.

(Chapter-5)

14. The seed management system should be revamped for introducing more advanced seeds, seed multiplication and easy and assured availability to farmers with a view to enhance production as well as cost efficiency. In view of presence of multiple agencies in seeds sector, the quality assurance and certification should be strengthened and streamlined. The National and State Seeds Corporations, Seed farms and the Universities have to undertake large scale seed production to meet the gap in demand and supply. The

*integration of farmers and farmers groups in seed multiplication programme needs promotion.*

*(Chapter-5)*

15. *The nutrition management should focus to control accumulating nutritional deficiency and address problem of soil fatigue. The policies and the management of fertilizers should be oriented to promote its balanced use appropriate to the soil conditions.*

*(Chapter-5)*

16. *The soil testing, distribution of soil health cards to all the farmers and creating awareness about on farm nutrition management need to be taken in mission mode and efforts should be made to accomplish it in the very first year of the plan.*

*(Chapter-5)*

17. *Water, one of the basic inputs for agricultural operation, is under serious stress. With very low water use efficiency. The scarcity of water resources is also increasing its cost of extraction. Therefore, the water use efficiency and water budgeting in agriculture should be one of the thrust areas. It is necessary to evolve a well coordinated strategy to manage the use of water resources such that (i) both surface and ground water supplies are maintained at desired level, and (ii) the quality of land and water resources does not deteriorate.*

*(Chapter-5)*

18. *Regarding irrigation, 11<sup>th</sup> Plan would require proper investment planning with four-fold objectives, (a) the replenishment of existing irrigation infrastructure, that has been depreciating over the years (b) completing unfinished projects on priority basis, (c) the creation of new irrigation projects, and (d) substantive increase in the cropping intensity in irrigated areas.*

*(Chapter-5)*

19. *Like the use of micro-nutrients and water, the chemicals are also used indiscriminately and un-judiciously. The use of un-prescribed pesticides in inappropriate doses is not only disturbing the soil conditions but is also destroying the healthy pool of bio-control agents that normally co-exist with the vegetation. There is a need for a national plan for bio control measures.*

*(Chapter-5)*

20. *Considering the ill effects of chemical pesticides, Integrated Pest Management (IPM) needs to be undertaken in a more systematic and coordinated manner.*  
(Chapter-5)
21. *The enhancement of energy use efficiency in agriculture is an integral part of improving overall efficiency in the farm sector. The farm mechanization is important in this context. Substantial knowledge on farm mechanization is available with different institutions and research centres. However, there is a demand supply mismatch in different regions. The findings of “Study Relating to Formulating Long Term Mechanization Strategy for Each Agro-Climatic Zone/State” (ICAR) need to be considered for formulating the Farm Mechanization Strategy during 11<sup>th</sup> Plan.*  
(Chapter-5)
22. *The energy use efficiency also needs to be viewed in the context of use of power for irrigation. The 11<sup>th</sup> Plan programmes should encourage aquifer-wise formation of tubewell societies in the villages to address both the water use efficiency as well as energy consumption.*  
(Chapter-5)
23. *Besides the aforesaid core issues there are other aspects which are assuming significance in the economic environment facing agriculture. Accelerating agricultural exports would necessitate greater integration of production system with post harvest infrastructures and procedure to meet the conditions of market access in different countries, addressing the issues of Sanitary and Phyto-Sanitary (SPS) and other food and bio-safety requirements.*  
(Chapter-5)
24. *Further, the integrated development of agriculture for inclusive growth has to take note of diversified growth covering crops, fishries, livestock and on and off farm value addition for enhancing profitability, farm returns and rural income.*  
(Chapter-5)
25. *The demand of commodities, particularly, agricultural commodities is linked to its requirement for final consumption by the population and intermediate consumption in the supply chain. The supply for the consumption requirement during the reference period gets sourced either from the domestic production, depletion of carry over stocks or through imports.*

These projections have been worked out during the planning process in the past, and been updated / evolved by various organisations dealing with commodities and by various scholars from time to time using different methodological frameworks and sets of data. The range of Demand Supply projections for terminal year of 11<sup>th</sup> Five Year Plan (2011-12) are given below:

(In million tonnes)

Crops	Demand Projections for 2011-12	Range of Production Supply Projections for 2011-12
Foodgrains	244@@	214 – 240 (from alternative methods)
Oilseeds	53	45.**
Sugarcane	340#	278-334 (from alternative methods)
Cotton*	29	16 – 50 (from alternative methods)
Jute & Mesta@	10	11

\*Million bales of 170 kg each      @Million bales of 180 kg each  
 @@ includes 2 million tonnes for augmenting buffer stock and average export of 8 million tonnes      # includes 12 lakh tonnes for augmenting buffer stock and average export of 5.4 lakh tonnes of sugar      \*\*The supply projections for oilseeds are based on realization of potential yield. This supply assessment would improve self sufficiency level in edible oils from existing 55% to 80%. However, if the level of edible oil imports to meet the domestic demand is assumed to be retained at present level (4.7 million tonnes), then the supply would require to be of 36 million tonnes of domestic production of oilseeds.

(Chapter-6)

26. *The complexity and dimensions of agriculture necessitate institutional interventions, support and delivery which cannot be otherwise arranged and organized by the numerous small entrepreneurs spread over the length and breadth of the country. Since the subject is in “State List,” the primary onus of public intervention rests on respective state governments, but the active involvement and commitment of Union Government in the national context remains extremely relevant. However, the government initiatives and interventions for agricultural developments are set in a matrix of horizontal and vertical layers of decentralization across Ministries/Departments of Union Government and States. The Plan outlay of the three departments of Union Agriculture Ministry for the financial year 2006-07 at Rs.6977 crores was 1.15% of sectoral GDP. The total aggregate state budgetary outlay for agriculture is 0.7% of agricultural GDP. Need for augmenting investment, along with other measures suggested in the Report, is evident.*

(Chapter-7)

27. *There is wide variation in the priorities assigned by the states to agriculture and there is lack of synergy between the central initiatives and the state initiatives. The synergy is also required among initiatives taken by relevant departments and ministers for water management, land development, energy use and nutrient management, and these would also need to be dovetailed with the overall development planning. The strategies for agricultural development intervention would also need linkages with Panchayati Raj institutions. While reviewing the scheme structure, working group observed that several schemes, despite their small allocations, are quite relevant from the point of view of institutional support to the producers.*

*(Chapter-7)*

28. *Considering the various dimensions of supply potential from crop husbandry in consonance with the scenario of demand and with consideration of sustainable agricultural growth, the following growth scenario for 11<sup>th</sup> Plan is considered desirable as well as feasible.*

	<b>GDP Share %</b>	<b>Proposed Gr. Rate % per annum</b>
<b>Crops</b>	<b>46</b>	<b>2.70%</b>
<i>Foodgrains</i>	<i>26</i>	<i>2.3</i>
<i>Oilseeds</i>	<i>6</i>	<i>4.0</i>
<i>Other crops</i>	<i>14</i>	<i>3.0</i>
<b>Horticulture</b>	<b>21</b>	<b>5.0%</b>
<b>Livestocks</b>	<b>25</b>	<b>6.0%</b>
<b>Fisheries</b>	<b>4</b>	<b>6.0%</b>
<b>Forestry/logging</b>	<b>4</b>	<b>0.0%</b>
<b>Total</b>		<b>4.10%</b>

29. *Agricultural Statistics system of the country is evolved over a period of time to reflect the complexities in the agrarian economy. However, the system has recently come under criticism on counts of reliability, timely availability, coverage, and failure to meet the emerging demand for statistics. The National Statistical Commission had reviewed the system in detail and the 10<sup>th</sup> Plan envisaged the implementation of its recommendations. However, a large number of these recommendations still remain unattended.*

*(Chapter-9)*

30. Besides ensuring the implementation of these recommendations, a review of schemes such as Timely Reporting Scheme (TRS) and Improvement of Crop Statistics (ICS) that have been continuing for a long time, is necessary to reorient them for contemporary needs. The TRS can be affectively oriented to provide estimates of area under horticulture crop.

(Chapter-9)

31. For strengthening agricultural statistics in the north eastern region, the North East Council may be made coordinating agency.

(Chapter-9)

32. It is recommended that to actualize the 11<sup>th</sup> Plan vision of broad based and inclusive growth, an integrated system for rural and agricultural statistics be put in place to facilitate planning and development of diversified rural economy of which agriculture is the key component.

(Chapter-9)

## 1. Introduction

The Planning Commission vide their Order No. . M-12043/10/2006- Agri dated 9<sup>th</sup> June, 2006 constituted the Working Group on Crop Husbandry, Agricultural Inputs, Demand and Supply Projections and Agricultural Statistics for the Eleventh Five Year Plan (2007-12) (hereafter referred as Working Group) under the Chairmanship of Prof. V. S. Vyas. The copy of the Planning Commission Order with the composition of the Working Group and the Terms of Reference is at Annexure – 1.

1.2 The Working Group was assigned 13 **Terms of Reference** in three broad sub heads **Crop Husbandry and Inputs, Demand Supply Projections and Agricultural Statistics**

### **Approach of the Working Group**

1.3 First Meeting of the Working Group was held on 27<sup>th</sup> July, 2006 that was also participated by Prof. Abhijit Sen, Member, Planning Commission. The Working Group oriented itself with the perspective of Eleventh Five Year Plan, as outlined in its Approach Paper, synthesised the TOR and identified the core issues. It decided to form three Sub Groups, each to be steered by the Convener and the Co-Convener, to examine the issues in depth and accordingly assigned the issues and TOR to them. Due to the sub-sectoral linkages of the issues, there was some overlap in the TORs to be dealt by the Sub Groups.

### **Sub Group – A : Review of Agriculture - Programme and Schemes**

**Convener – Dr. N.B. Singh**, Agricultural Commissioner, Department of Agriculture and Co-operation, New Delhi.

**Co-Convener – Prof. J. George**, Chair, Faculty of Economics and Development Planning (FEDP), Haryana Institute of Public Administration,

## **Sub Group – B Technology and Inputs**

**Convener : Dr. G. Kalloo**, DDG, Crops, ICAR, Krishi Bhawan, New Delhi.

**Co-Convener : Dr. M. Mahadevappa**, Former Vice- Chancellor, University of Agricultural Sciences, Dharwar,

## **Sub Group – C : Demand Supply Projections & Agricultural Statistics**

**Convener : Dr. S.M. Jharwal**, Principal Adviser, Department of Agriculture and Co-operation, New Delhi.

**Co-Convener : Dr. S.D. Sharma**, Director, IASRI, New Delhi.

1.4 Dr. V. V. Sadamate, Adviser (Agriculture), Planning Commission and Dr. Rajiv Mehta, Member- Secretary, Commission for Agricultural Costs and Prices, New Delhi and Member Secretary of the Working Group were associated with all the three Sub Groups to provide overall synergy amongst the issues and TOR. The Working Group decided to Co-Opt Prof. R. B. Singh, Member, National Commission on Farmers and Mr. Vijay Sardana, Executive Director CITA as the Members of the Group. The Sub Groups could hold, only one meeting each as follows:

Sub Group – A Review of Agriculture – Programme and Schemes- Meeting held on 18th August, 2006 ( Convener: Dr. N. B. Singh, Agr. Commr.)

Sub Group - B Technology and Inputs - Meeting held on 22nd August, 2006 (Convener: Dr. G. Kalloo, DDG ICAR)

Sub Group C Demand Supply Projections & Agricultural Statistics - Meeting held on 19th August, 2006 (Convener: Dr. S. M. Jharwal, Pr. Adv.)

1.5 Second meeting of the Working Group was held on 7th September, 2006 in which Sub Groups made presentations and flagged the issues crystallised by them, which were comprehensively consolidated in the Record of Discussion, enabling the Members to respond and comment.

1.6 The core findings of the Working Group were presented before review session of the Planning Commission on 27<sup>th</sup> October, 2006. Third meeting of the Working Group held on 16<sup>th</sup> November, 2006 discussed the draft report circulated by the Member Secretary and the draft report of the Sub Group – C on Demand and Supply Projections and Agricultural Statistics, presented by Shri Vijay Kumar, Adviser.

## 2. Vision for Agriculture in the Eleventh Five Year Plan

The **Approach Paper** for the 11<sup>th</sup> Five Year Plan, unveiled by the Planning Commission, provided a vision for the accelerated growth of the economy including that for the agriculture and rural economy. The Paper seeks the opportunity to restructure policies for achieving **accelerated, broad based and inclusive growth, aiming to faster reduction in poverty and helping to bridge the divide** in the economic conditions amongst different segments of population. The essence of the strategy to actualise the stated vision is the rapid growth, aiming for **9 % annual increase in the overall economy** during 11<sup>th</sup> plan period (2007-08 to 2011-12). This growth target is considered attainable and feasible against the background of accelerated 7% annual growth achieved during 10<sup>th</sup> plan (2002-03 to 2006-07) that itself was up scaled from 5.5% annual growth achieved during 9<sup>th</sup> plan (1997-98 to 2001-02). Given the moderated population growth at 1.5% per year, the 9% targeted growth would eventually result into doubling of real per capita income in 10 years.

2.2 The approach to 11<sup>th</sup> Five Year Plan focuses on **faster and more inclusive growth** and its actualization is accordingly factorized into **4.1% annual growth from Agriculture Sector**, 9.9% annual growth from Industry and 9.4% annual growth from Services sector. The Approach Paper acknowledges that the stimulation of agricultural growth would not be free from challenges particularly when the average annual sectoral growth had decelerated from 3.2% in eighties to only 1.5% subsequently. However, the ambition of the growth has been backed with the **investment rate** of 35.1 % of GDP of which 10.2 % of GDP investment is envisaged to be sourced from public channels and 24.9 % of GDP investment from private. Thus the investment rate looks forward to a substantial hike from 27.5 % of GDP during 10<sup>th</sup> Plan and 23.8 % of GDP during 9<sup>th</sup> Plan.

2.3 The slackness in the agricultural growth in the recent decade had co-existed with accelerated growth in non agricultural sector. This had widened the gap between rural and urban economy. The absence of percolation of relative economic gains in the rural economy to neutralize the effects of mounting demographic pressure has **accentuated the rural distress**. The distress in agriculture is now seen to be not confined only to the

small and marginal farmers but is affecting across the size classes in agrarian economy. Thus the accelerated growth of 4%, which appears to be a daunting task of doubling the existing rate of growth, is considered to be the need of the hour and would require channelising the resources for ushering second green revolution.

2.4 The Planning Commission's **assessment of agricultural growth** is preliminary and is primarily based on demand assumption of increasing consumption as a result of faster reduction in poverty, 10% growth in the export of agricultural commodity and import remaining unchanged. However, there are critical issues both on demand as well as supply side and required interventions and there issues therefore, are central to the task assigned to the Working Group.

### 3. Critical Issues before the Working Group

In the context of the 11<sup>th</sup> Plan vision for the economy in general and for agriculture sector in particular, dovetailing with **broad based and inclusive growth, aiming to faster reduction in poverty and helping to bridge the divide** in economic conditions amongst different segments of population, the Working Group has critical and core responsibility of assessment of feasibility and desirability of achieving such growth, as reflected in its Terms of Reference (TOR). The envisaged agricultural growth in the Approach Paper is more than double the growth likely to be achieved during the Tenth Five Year Plan and that was realized in Ninth Five Year Plan. One of the core issues before the Working Group, therefore, was to delve on the feasibility and desirability of growth that if the envisaged growth for 11<sup>th</sup> Plan is too ambitious and will it be achievable? Further it would also involve the assessment of **response of natural resources** and the extent to which these resources can be harnessed and oriented for attaining the growth ambition. This expectation had made the TOR of the Working Group quite comprehensive and elaborate and necessitated comprehensive analysis, taking into account constraints on supply side and technology as well as validation of assumption of demand, based on which the ambition of growth is visualized.

#### 3.1 Demand Side Issues:

- Overall economy during the 10<sup>th</sup> Plan has surged ahead impressively and this high economic growth was expected to translate into enhanced demand pressure, consequence to higher disposable income with the consumers. This postulation has been extended to 11<sup>th</sup> Plan also.
- In contrast to the accelerated economic growth, the **deceleration of agricultural growth** was witnessed during 9<sup>th</sup> as well as in 10<sup>th</sup> Plan. The production growth of several agricultural commodities, such as foodgrains, had been much **lower than the population growth causing stress on supply**.
- However, this **supply mismatch with demand** did not reflect on the market and the majority of agricultural commodities witnessed either **prices depression** or

their aggregate movement during the Plan was slower than aggregate inflation except in the terminal year of 10<sup>th</sup> Plan. The **weak supply co-existed with slack demand**, despite relatively faster growth of economy during 10<sup>th</sup> Plan.

- The plausible reason for this mismatch was the concentration of accelerated economic growth in select urban pockets and its weak diffusion over larger segments of population. As a result, aggregate consumption propensity specially for foodgrains, did not get adequately stimulated.
- This phenomenon also affected the farm income adversely. Adversity of relative prices of agricultural products is often attributed for **decline in farm profitability**.
- Against this background **sustainability of envisaged 4% annual growth** of agriculture needs considerable thought.

3.2 However, certain steps have already been taken to **energise the demand impulses** in the economy.

- The **National Rural Employment Guarantee Scheme** is likely to enhance the purchasing power of the population.
- The 11<sup>th</sup> Plan envisages substantial hike in **the outlays for social sectors** such as rural education and health that would spare household disposable income for other goods and services. The thrust on rural infrastructure and rural connectivity envisages strengthening commodity flow opportunities.
- The **promotion of agricultural exports** with several initiatives of agri-export zones is also expected to enhance the demand, encourage agricultural diversifications and value additions.
- The **policies have been re-shaped** for a congenial environment for private investment in marketing, post-harvest methods and other such measures for strengthening linkages of farm sector.
- These ongoing initiatives should supplement the augmentation of demand.

### 3.3 Supply Side Issues:

There are serious supply side issues in agriculture as listed below:

- The slackness of production and declining productivity growth needs urgent attention. There is no dramatic **technological breakthrough** visible in the crop

production system and even the existing technology appears to have not been exploited fully.

- The major supply side constraint is on account of **depletion and degradation of production resources mainly land, water and soil**. As a result, **production response to inputs** has seriously eroded.
- There is urgent need to **identify the region and crop specific constraints** and to address the impediments in policies.
- The priority area in the supply constraints relates to **seeds**. There is substantial gap between the availability and performance of seeds in the domain of research and its availability, adoption and performance in field conditions. The lag in **technology transfer** is a critical area to be addressed. In this respect, constraints are highlighted on account of **delivery system of research**, though from ICAR's point of view, there are no constraints in research availability. **Timely and adequate availability of quality seed is the core supply side issue**.
- As already stated, the National Commission on Farmers has addressed this problem terming it wide prevalence of **knowledge deficit** existing in our agrarian structure.
- The **institutional issues**, delivery mechanism, credit and extension continue to be the core concern areas.
- The issue of **crop diversification** may need to be given a fresh look both from supply and demand perspective.
- The supply side issues also need to be addressed in conjunction with **marketing** and value addition linkages. Besides, the emerging market environment requires production system to be adjusted to meet specific **requirements of consumption and quality**.
- The supply issues also have to be dovetailed with on going **reform agenda in marketing**, contract farming, fostering private investment and involvement of farmers' organizations and self help groups for integrating the production system with market.
- These developments, while offer newer opportunities for Indian agriculture, also bring to focus the risk in agriculture. **Agricultural risk** is prevalent on the front

of production, price and also on adoption of newer technologies.

- The **sourcing of seeds** from numerous channels, investments for improving quality for exports and **global trade uncertainties** are some of the additional risk dimensions.

Therefore, for meeting the growth targets, the supply side issues need meticulous attention with due consideration to zone specific requirements.

### **Investment in Agriculture**

3.4 **Declining rate of investment in agriculture** was also attributed to be an important factor for slackened agricultural growth in recent decade. The Approach Paper addressed this crucial dimension and accordingly the ambition of the growth had been backed with the **investment rate** of 35.1% of GDP of which 10.2% of GDP investment is envisaged to be sourced from public channels and 24.9% of GDP investment from private. Thus the investment rate looks forward to a substantial hike from 27.5% of GDP during 10<sup>th</sup> Plan and 23.8% of GDP during 9<sup>th</sup> Plan. The options of public and private investments have to be dovetailed with the status of capital stock and depreciation thereof acknowledging the higher concentration of private capital stock of the order of 75 percent of total capital stock in agriculture. The investment projections in 11<sup>th</sup> Plan accordingly promoted private investment as well as **Public Private Partnership** in creation of infrastructure. Therefore, proper synergy between public and private investment would be necessary.

### **Other Related Issues:**

3.5 Besides, the agriculture sector of late has witnessed **dynamics of economic and market orientation** such as diversification to high value crops as well as value addition. These emerging changes are supply driven, due to available cropping options and corresponding support systems and demand driven due changing consumption habits and post harvest linkages. These changes, likely to reflect on overall growth, will necessitate assessment of investment and supporting infrastructure as well commitments to allocate production resources for domestic supply sustenance to meet food security requirements of the country.

3.6 It is also important to seek the answers for prevailing **agrarian distress**, why the farmers are taking extreme steps of committing suicides. Do we hear non farm entrepreneurs committing suicides, as often and as routinely we hear farmers committing suicides? In urban areas, there are more windows for economic engagements. The case is not the same for the people living in rural areas. The fragile income generating base in the rural economy is found to be vulnerable and unstable. Therefore, agricultural development and its growth may need to be seen holistically, **beyond the horizon of crops.**

3.7 The demographic rigidity of rural domain and resultant increase of absolute population dependent on agriculture is causing **fragmentation of operational holdings** and accentuating the **preponderance of small and marginal farmers.** These farmers account for nearly 80 percent of all operational holdings. Resultant to unabated demographic pressure and non-existence of alternative occupational options, the average size of operational holdings has steadily fallen to 1.34 hectare (2000-01 Agricultural Census – provisional). The aggregate area cultivated by small and marginal farmers is considerable and is gradually increasing. This disturbing trend, is impinging on agrarian economy in multiple dimensions farm household income and their propensity to invest, is also exerting pressure on already **stressed delivery mechanism** for input distribution, extension, credit and marketing facilitation due to increasing number of stakeholders striving for their livelihood security.

3.8 In the recent years, the stagnation in agriculture, particularly in the production of foodgrains has brought the issue of **macro and micro food security** on the forefront of policy consideration. Country's food management system finds itself vulnerable on more than one count. The supply constraints have destabilized the flow of foodgrains procurement and food distribution. In the evolving economic environment, the market forces are apparently denting the established mechanism of public market intervention and procurement. The unprecedented increase in the prices of wheat in the marketing season 2006-07, though had benefited the price realization by farmers, but has significantly affected the consumers. On the other hand, the livelihood security of millions of people dependent of agriculture is becoming more vulnerable due to low

levels of farm income caused by a whole range of factors such as endowments of fall in terms of trade, low price realisation due to cheaper and unabated imports declining level of delivery of supports and inputs and increasingly risk in agriculture. Though, the consumption basket and consumer's profile is undergoing changes, albeit in the pockets of higher dynamics of economic restructuring, and though the Indian economy is becoming more market friendly and is termed as one of the fastest growing economy, albeit in macro sense, still the country has increasing number of food insecure people inside as well as outside the domain of agrarian economy who can not be left at the mercy of market forces alone.

3.9 In the emerging economic **environment of agricultural trade liberalization**, there are schools of thought arguing for de-linking the issue of food security from the food production self sufficiency. This argument is based on the premise that India's healthy foreign exchange reserves may take care of bridging the demand supply gap through liberalized imports. The food policy postulations of self-sufficiency in production, equitable distribution, and price stability are, therefore, set in a more complex economic environment, necessitating urgent attention of policy makers and planners for repositioning the aspects of sustainable food security, that has shown signs of vulnerability at the on set of 11<sup>th</sup> Plan. Yet the consideration of livelihood of large population dependent on agriculture, with limited occupational choices in short to medium term, can not be ignored.

## 4. Review of Agriculture in the past decade

During two and half decades of green revolution, the agriculture sector in India has been successful in keeping pace with the rising food demand of a growing population. This performance of satisfaction and optimism, however, lost its momentum in the recent decade. The country with a billion mouths to feed is under constant pressure to wring more out of its agricultural resources, given that on the one hand cultivated land is shrinking and on the other hand returns on agricultural inputs are diminishing.

4.2 As Stated earlier, the 11<sup>th</sup> Five Year Plan seeks the rapid growth of **9% annual increase in economy** and **4% annual growth from agricultural sector**. However, stimulation of agricultural growth also acknowledged the **challenges** faced by the sector, particularly when the average annual sectoral growth has decelerated from 3.2% in eighties to only 1.5% subsequently. Against this background the postulation of accelerated growth of 4% from the agricultural sector, which appears to be a daunting task of doubling existing rate of growth, requires the review of the sector factorize the growth deceleration and identify specific areas of growth dynamics in the recent past.

### **Trend of Agricultural GDP**

4.3 The contribution of **Gross Domestic Product from Agriculture and Allied Sector**, according to the **concepts of National Accounts**, is measured in terms of value addition in aggregate production in the production boundary of Agriculture (crop husbandry, horticulture and plantations), Animal Husbandry, Fisheries and Forestry and logging. GDP for agriculture and allied sector during 2005-06 was estimated at Rs 61 Trillion at current price (USD 130 Billion), which was 19 percent share in GDP of total economy. The envisaged 4 percent growth in agriculture thus relates to this segment of economy. However, the economic contribution of several post harvest initiatives such as marketing, value addition, processing, packaging and such related activities in the periphery of agriculture that had been the thrust areas of agrarian reforms for a diversified agricultural growth, however, are not captured as GDP share of agriculture and allied activities. These peripheral activities are of particular significance for a broad based, diversified growth of rural economy.

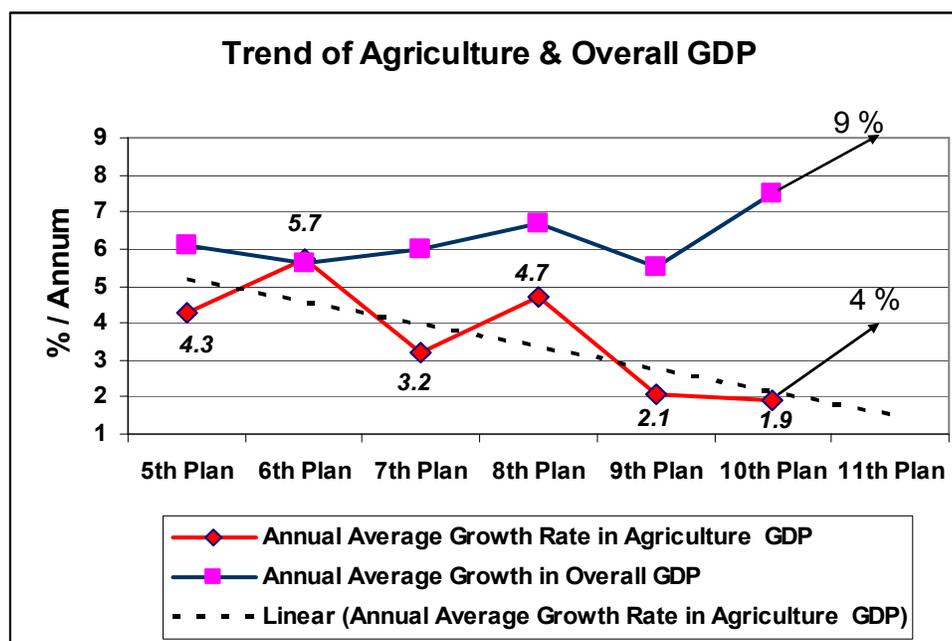
Table 4.1-- Annual Growth of Agriculture and Allied Sector

PLANS	Average Annual Growth %	
	Agriculture and Allied Sector	Total Economy
VIth Plan (80-85 )	5.7	5.5
VIIth Plan (85-90 )	3.2	5.8
VIIIth Plan ( 92-97 )	4.7	6.8
IXth Plan (97-02 )	2.1	5.5
X th Plan (02-07)	1.9 (Four Years)	7.5

*Data Source: National Accounts Statistics*

4.4 Riding on the waves of green revolution, the **growth of agriculture and allied sector** in terms of macro GDP indicators was most impressive during the period of 6th Five year Plan (1980-81 to 1984-85). After reaching a peak of 5.7%, the annual average growth of the sector moderated to 3.2% and 4.7% per annum respectively during 7th and 8th Five Year Plan respectively (Table-4.1). The deceleration of agriculture sector growth had sharpened in the late nineties as was evidently reflected by the modest 2.1% growth during 9th plan. First four years of the ongoing 10th Plan witnessed further erosion of growth to less than 2 percent.

Chart 1 Trend of Agricultural and Overall GDP



4.5 The performance of Indian Agriculture was most impressive during 6<sup>th</sup> Plan and the growth of agriculture and allied sector led the overall growth of the economy. In subsequent Plans, the growth of agriculture and that of non-agriculture moved in different trajectories. While the overall growth of economy accelerated, the growth of agricultural sector decelerated. (Chart-1) **The growth retardation had gradually set in after the 8<sup>th</sup> Plan and was not the making of 10<sup>th</sup> Plan.** It had been fermenting and firming up over the past decade. As a result, the gap between the growth of agriculture and allied sector and that of rest of the economy continued widening and the share of agriculture and allied sector in total economy started falling steeply. The endeavour of achievement of 9 percent growth of overall economy in 11<sup>th</sup> Plan is to sustain the growth target for agriculture and allied activities that will necessitate special efforts for reversing the trend of growth deceleration. These will require not only short term measures, but also steps from medium to long term perspective.

#### **Production Performance**

4.6 The slackening of agricultural sector growth in the past decade, covering the periods of 9<sup>th</sup> and 10<sup>th</sup> Plan, was translated into **subdued production response**. During the 10<sup>th</sup> Plan, country faced severe draught in 2002-03 that caused sharp fall in the production, but unlike in the decade of eighties, the production recovery in the subsequent year was not spectacular. The lukewarm performance resulted into stagnant production particularly that of foodgrains during 10th Plan and the Plan target of production of 230 million tonnes of foodgrains appeared too ambitious. This target was arrived as per the production required in 2006-07 on the basis of per capita net availability from the 212.9 million tonnes aggregate foodgrain production in the benchmark year 2001-02 and is likely to be missed by a substantial 10% margin.

4.7 In three out of first four years of the 10th Plan, the foodgrain production was lower than the benchmark production of 2001-02, with the exception of 2003-04, when the all time record production of 213.19 million tonnes was only 0.2 percent higher than the benchmark (Table-2). This achievement was largely attributed to benevolent monsoon, that helped a record out put of 37.6 million tonnes of coarse cereals. The foodgrain production performance was less inspiring during 10th Plan on the production

performance of wheat and rice, the two crops that had been the anchor of green revolution and sustainability of food security in the past. The production of both these crops remained much lower than the corresponding all time peak production. In three of the four 10th Plan years, wheat production was less than 70 million tonnes. The record production of 76.37 million tonnes of wheat, attained in 1999-2000, remains unsurpassed in the subsequent six years.

Table – 4.2 : Production Performance of important Crops during Xth Plan

Year	Production ( Million Tonnes)							
	Foodgrains	Rice	Wheat	Coarse Cereals	Pulses	Oilseeds	Sugarcane	Cotton
2001-02	212.85	93.24*	72.77	33.37	13.37	20.66	297.21*	10.00
2002-03	174.77	71.83	65.76	26.07	11.13	14.84	287.38	8.62
2003-04	213.19*	88.53	72.16	37.60	14.91*	25.19	233.86	13.73
2004-05	198.36	85.13	68.64	33.46	13.13	24.35	237.09	16.43
2005-06	208.30	91.03	69.48	34.67	13.11	27.73	278.39	19.57*
Prev. Peak	Peak	*	76.37 (99.00)	*	*	*	*	*

Source: Directorate of Economics and Statistics (DES)

4.8 The production of pulses during the plan period hovered around 14 million tonnes, a level consistently existing over the decades. **Thus in the past four decades, there had not been any meaningful gain in the pulses production.** In 1958-59, country produced 13.15 million tonnes of pulses. **The silver lining of the performance during 10th Plan was that of oilseeds and cotton,** the production response of these crops had been impressive with record output of 27.73 million tonnes and 19.57 million bales respectively during 2005-06. It may also be noted that throughout the 10<sup>th</sup> Plan, there was **consistent import substitution of pulses and oilseeds** of substantial level, a phenomenon unprecedented compared to earlier plan period.

### Growth Trends of Area, Production and Productivity

4.9 The performance of agriculture is also analysed in terms of medium term growth of area, production and productivity of cereals, pluses, oilseeds, cotton and sugarcane in two decadal intervals of 1985-86 to 1995-96 and 1995-96 to 2004-05 (Table 3). These two intervals had distinct performance of agriculture, coinciding with the periods of pre and post liberalization of agricultural trade and provide insight for policy introspection.

4.10 There had been a **declining trend of acreage for most of the crops** during the period 1995-96 to 2004-05, except that for wheat, the acreage of which registered modest growth of 0.11 per cent per annum. In the decade prior to 1995-96, the area under oilseeds, cotton and sugarcane registered impressive growth but this trend also reversed in later decadal interval. Given the near stagnant net sown area of 140 million hectares and gross cropped area of about 190 million hectares, there was increase in area under certain crops at the expense of declining area under other crops. In the subsequent decade, the scope of increase in area vanished across the crop segments. This trend clearly indicated **constrains in availability of land for agriculture** due to competing pressure on land demand for non-agriculture sector and rapid urbanization witnessed in the recent years. Thus during the 11th Plan, possible increase in aggregate supply of land for the purpose of agriculture is not easily foreseen unless vigorous effort are made to covert fellow and waste land for cultivation and adequately compensate for the high productivity land getting released by agriculture sector for other uses.

4.11 There was **sharp decline in the growth rate of productivity of all the crops** in the decade of 1995-96 to 2004-05. The productivity growth of rice and wheat, the anchors of green revolution in the past, decelerated to 0.82 per cent per annum and 0.56 per cent per annum respectively from 2.40 per cent per annum and 2.61 per cent per annum respectively in the previous decade. The productivity of pluses during 1995-96 to 2004-05 had a declining (negative) trend of 0.07 per cent, **reflecting the absence of any technological breakthrough** reaching at farmer's end. Only cotton and maize registered productivity growth rate in excess of 2 per cent during 1995-96 to 2004-05. The healthy performance of cotton and maize, the semi arid crops grown generally outside the traditional green revolution regions, is combined response to the technology, delivery and post harvest linkages.

Table –4. 3 Decadal Trends of Crop Area, Production and Productivity

				Fitted Gr Rate (% / Annum)			
FOODGRAIN							
Year	Area	Production	Yield	Period	Area	Production	Yield
T.E.1985-86	129	149	1162	85-86 to 95-96	-0.38	2.74	3.14
T.E.1995-96	123	185	1513	<b>95-96 to 2004-05</b>	<b>-0.35</b>	<b>0.55</b>	<b>0.90</b>
T.E.2004-2005	119	195	1641	85-86 to 2004-05	-0.27	1.76	2.03

CEREALS							
T.E.1985-86	105	137	1301	85-86 to 95-96	-0.38	2.92	3.31
T.E.1995-96	100	172	1721	<b>95-96 to 2004-05</b>	<b>-0.39</b>	<b>0.61</b>	<b>1.00</b>
T.E.2004-2005	97	182	1882	85-86 to 2004-05	-0.25	1.88	2.14
Rice							
T.E.1985-86	41	60	1475	85-86 to 95-96	0.59	3.00	2.40
T.E.1995-96	42	79	1865	<b>95-96 to 2004-05</b>	<b>-0.37</b>	<b>0.45</b>	<b>0.82</b>
T.E.2004-2005	41	81	1937	85-86 to 2004-05	0.34	1.78	1.44
Wheat							
T.E.1985-86	23	46	1918	85-86 to 95-96	1.03	3.67	2.61
T.E.1995-96	25	63	2474	<b>95-96 to 2004-05</b>	<b>0.11</b>	<b>0.67</b>	<b>0.56</b>
T.E.2004-2005	26	69	2642	85-86 to 2004-05	0.85	2.60	1.73
Fitted Gr Rate (% / Annum)							
COARSE CEREALS							
T.E.1985-86	40	30	758	85-86 to 95-96	-2.45	1.30	3.85
T.E.1995-96	32	30	934	<b>95-96 to 2004-05</b>	<b>-0.85</b>	<b>0.86</b>	<b>1.72</b>
T.E.2004-2005	29	32	1119	85-86 to 2004-05	-1.80	0.73	2.58
Fitted Gr Rate (% / Annum)							
PULSES							
Year	Area	Production	Yield	Period	Area	Production	Yield
T.E.1985-86	24	13	541	85-86 to 95-96	-0.41	0.61	1.03
T.E.1995-96	23	13	587	<b>95-96 to 2004-05</b>	<b>-0.17</b>	<b>-0.24</b>	<b>-0.07</b>
T.E.2004-2005	22	13	587	85-86 to 2004-05	-0.37	0.23	0.59
Fitted Gr Rate (% / Annum)							
Oilseeds							
Year	Area	Production	Yield	Period	Area	Production	Yield
T.E.1985-86	19	12	644	85-86 to 95-96	3.76	7.56	3.67
T.E.1995-96	26	22	831	<b>95-96 to 2004-05</b>	<b>-1.03</b>	<b>-0.83</b>	<b>0.20</b>
T.E.2004-2005	24	21	886	85-86 to 2004-05	0.96	2.89	1.90
Fitted Gr Rate (% / Annum)							
COTTON (Production in Million bales of 170 kg each)							
Year	Area	Production	Yield	Period	Area	Production	Yield
T.E.1985-86	7.5	9.4	213	85-86 to 95-96	1.68	4.78	3.05
T.E.1995-96	8.1	14.3	302	<b>95-96 to 2004-05</b>	<b>-1.41</b>	<b>1.36</b>	<b>2.81</b>
T.E.2004-2005	8.0	18.6	394	85-86 to 2004-05	1.17	3.44	2.25
SUGARCANE							
T.E.1985-86	2971	171681	57790	85-86 to 95-96	2.92	4.52	1.58
T.E.1995-96	3812	262100	68756	<b>95-96 to 2004-05</b>	<b>-0.33</b>	<b>-1.51</b>	<b>-1.18</b>
T.E.2004-2005	4040	252778	62568	85-86 to 2004-05	1.72	2.14	0.42

Area : Million hectares, Production: Million Tonnes, Yield : Kg per hectare

Data Source: Directorate of Economics and Statistics

## Resource Use and Response

4.12 The cumulative impact of declining area, slackness in productivity gain and adversity of climate reflected on near stagnant production during 1995-96 to 2004-05. The disturbing performance of negative trend of production in pulses and oilseeds reflected the absence of any meaningful impact of Technology Missions. The subdued performance of agriculture on productivity front in the recent decade raises serious **concern on the technology development** in agriculture and/or **inert response of production to technology and of farmers to its adoption**.

4.13 It may also need to be noted that the recent years had also witnessed **subdued performance of monsoon** and resultant accumulated deficiency in rainfall precipitation, leading to aggregate water deficiency. In the past six out of eight years (1998 to 2005), the aggregate monsoon rainfall was less than the long period average (LPA). The monsoon rainfall deficiency during 2002 and 2004 was more than 10 per cent. This adversely affected soil moisture retention and ground water recharge. As compared to this, the monsoon precipitation in 7 out of 9 years from 1989 to 1997 was more than LPA. Thus the **agro-climatic behaviour had not been consistently favourable in recent years**.

4.14 Expansion of irrigation had played a crucial role in formenting green revolution in the decade of seventies and eighties. Of late, there had **not been any significant improvement on irrigation** front. The net irrigated area crossed 50 million hectares mark in 1992-93 and it peaked at 57 million hectare in 1999-2000. The gross irrigated area in the corresponding period increased from 67 million hectares to 78 million hectares. Thus, the average annual increment in the net irrigated area during these 8 years was less than one million hectare per year and that of gross irrigated area was 1.3 million hectares. The incremental gain in terms of cropping intensity in respect of irrigated area was not much better than the overall cropping intensity of about 135 per cent. This is not in consonance with the expectations that irrigation would enhance cropping intensity. There are reports that the existing infrastructure of irrigation is depreciating and the pace of new infrastructure is slow.

4.15 Post 1999-2000, the **irrigated areas has shown a declining trend**. Excessive exploitation of ground water for the purpose of irrigation has been adversely affecting the water table in different parts of the country. Besides, there is apprehension that in certain high productivity regions of the country, irrigated area is getting released out of agriculture for far more profitable and growth stimulating non-agricultural economic activities and for expanding urban settlements. These factors are seriously threatening the efficiency and potential of production supply base of agriculture

4.16 The Table 4.4 gives the **use/production of inputs** particularly the breeder seeds, foundation seeds, distribution of certified/quality seeds and consumption of chemical fertilizers in the triennium ending 1996-97, 2000-01 and 2003-04. There was modest increase in the breeder seeds during the aforesaid period. However, the production of foundation seeds declined from 6.45 lakh quintals in TE 1996-97 to 5.77 lakh quintals in TE 2000-001, and thereafter modestly increased to 6.03 lakh quintals in 2003-04. Thus, the seed sector witnessed depletion in the production of foundation seeds during 9<sup>th</sup> and 10<sup>th</sup> plan. The distribution of certified/qualified seeds however maintained an increasing trend of 79.01 lakh quintals, 86.41 lakh quintals and 96.61 lakh quintals in the aforesaid periods. The nomenclature of the certified qualified seeds also includes TL (truthfully label). It is understood that a large quantity of TL seeds are the old seeds whose validity has been re-notified beyond their recommended period of use. Substantial production gains from use of such TL seeds remains in doubt.

Table 4.4 : Input use in Agriculture

Programme	Use/Production in Triennium Ending			
	Unit	1996-97	2000-01	2003-04
<b>Production of Breeder Seeds</b>	<b>Th. Qtls</b>	<b>43.72</b>	<b>44.27</b>	<b>51.48</b>
<b>Production of Foundation Seeds</b>	<b>Lakh Qtls</b>	<b>6.45</b>	<b>5.77</b>	<b>6.03</b>
<b>Distribution of Certified/ Quality Seeds</b>	<b>Lakh Qtls</b>	<b>79.01</b>	<b>86.41</b>	<b>96.61</b>
<b>Consumption of Chemical Fertilisers</b>	<b>Kg per hectare</b>	<b>82.48</b>	<b>90.09</b>	<b>88.71</b>

*Data Source: Agricultural Statistics at A Glance 2005*

**4.17 Seed management**, a very crucial element for growth in productivity had witnessed serious problems in recent past. In many States, Seed Replacement Rate (SRR) is not improving. Nor is the seed production showing any significant improvement. There is practically no change in the Seed Replacement Rate in the States of Orissa, Bihar, Uttar Pradesh, Jharkhand, Assam, Madhya Pradesh and Chhattisgarh. There are missing links in the Seed Production System. There is a very little focus on hybrid seed production in public sector. **The Certified Seed produced in the country does not reflect the multiplication rate from breeder to foundation and foundation to certified seed** (Table-4.5)

Table 4.5: Mismatch in Seed Production System.

Quantity in qtls.

Crops	Seed Multipli- cation ratio	Breeder Seed Allotted/Lifted	Foundation Seed Produced	Certified/Quality Seed Produced
Wheat	1:40	5561.35 (R2003)	1,76,900 (1:32)	40,01,000 (1:23)
Paddy	1:80	932.84 Kh2003	2,00,000 (1:21)	36,70,000 (1:18)
Urad	1:40	215.38 Kh2003	7,500 (1:35)	207,000 (1:28)
Moong	1:40	178.46 Kh2003	4,500 (1:25)	1,90,000 (1:42)
Soyabean	1:16	7549.43 Kh2003	91,522 (1:12)	14,77,581 (1:16)

4.18 The existence of **technological gap and weakness in the delivery of technology** in seeds to the farmers has provided opportunity to private seed trade in the country. The private sector seed industry in India is growing appreciably and has made significant contributions to Bt.cotton, hybrids of maize, rice, sunflower etc. The share of Private Sector in seed Production is increasing whereas that of Public Sector is decreasing (Table-4.6) and during 10<sup>th</sup> Plan the private seed supply had over taken the seed sourcing from public sources.

Table 4. 6: Changing share of Private and Public supply of seeds:

Year	Share in seed production	
	Private	Public
2006	57.75%	42.25%
2005	58.00%	42.00%
2004	49.11%	50.89%

4.19 The consumption of **chemical fertilizers** increased from 82.48 kg per hectare tonnes in TE 1996-97 to 90.09 kg per hectare in TE 2000-01. However, in TE 2003-04 the consumption declined to 88.71 kg per hectare. This decline, to an extent could be attributed to the fall in area under cultivation during 2002-03 due to the drought. The average NPK ratio in the past two decades remained 7:3:1 as against the recommended 4:2:1. **The unabated imbalanced use of fertilizer** has seriously eroded the nutrition balance of soil, particularly in the prime Indo-Gangentic agricultural belt .

4.20 For accelerating growth in the production and attaining the target of 4 per cent aggregate growth during the 11<sup>th</sup> plan, the balanced use of fertilizer has to increase substantially. This however has to take note of **falling fertilizer use efficiency** in Indian Agriculture. The studies had shown that during the 1970-71, the fertilizer use efficiency was 17.1 (Ramaswamy – 2004, IJAE). It declined to 10.3 in 1980-81 and 8.1 in 1988-89. This was the period when growth of Indian agriculture as well as the performance of green revolution was most impressive. The fertilizer use efficiency by 2000 had fallen to 6.5. Thus, accelerated growth of agriculture would require a relatively higher and judicious consumption of fertilizer as compared to what had been in the past for gaining production response, with due consideration to the soil health, that has fallen over the years in many parts of agrarian space.

## 5. Thrust Areas for Restoration of Sustainable Growth

The experience of Indian agriculture at the onset of 11<sup>th</sup> Plan was that of diffusion of sustainability of its growth in the past decade. Therefore, formulation of strategies and orienting the efforts and programmes to actualize the vision of 4 percent growth from the agriculture sector during the 11<sup>th</sup> Plan, having the retrospection of its successively retarded growth performance during 9<sup>th</sup> and 10<sup>th</sup> Plan necessitate (a) identification of causes for growth deceleration, (b) appropriate measures to address the factors retarding the growth and stemming the slide in the performance of production and productivity and (c) restoring the growth trajectory of the agriculture in a manner, not only with the consideration of the vision of 11<sup>th</sup> Plan but for a **long term sustainable growth beyond 11<sup>th</sup> Plan.**

### Factorizing Growth Deceleration

5.2 The process of deceleration in agricultural growth that got established in the past ten years can be attributed to several factors. These factors are affecting the performance of agriculture not necessarily in isolation but in combination. Important amongst these relate to :

- Stressed natural endowments,
- Capital stock depletion and inadequate investment supplementation,
- Fatigue in production response to application of various inputs,
- Declining resource use efficiency and
- Persisting technology gap and knowledge deficit in agriculture.
- Weakness of the supporting institutions of research, extension, credit and marketing, and
- Inadequate risk mitigation measures

The issues of support services of research, extension, marketing and risk management are addressed by other working groups, the synthesis of issues in the ambit of TOR is as follows.

- (a) The deceleration in the growth in agriculture, however, is not uniform and there are regions that still hold **promise for stimulating the growth.** Therefore, it is important to examine the performance and potential in the disaggregated manner.

- (b) In the past, agricultural growth was driven by expansion of crop area as well as increase in productivity. It is clear the **country is not comfortably endowed with land resources** to facilitate horizontal expansion of crop area. Constraints of availability of land for agriculture, competing pressure of land demand for non-agriculture sector and rapid urbanization has emerged as the foremost at the onset of 11<sup>th</sup> Plan.
- (c) **The sharp erosion of total factor productivity** in agriculture is on account of multiple factor relating to technology fatigue, soil fatigue, declining fertilizer response rate depleting capital stock and agro-climatic aberrations.
- (d) On the technology front, the core issues related to **seeds**. About 85% of our farmers use farm-saved seeds that loose its vigor to enhance the productivity over a priod. **Low seed replacement rate**, uncertified seeds of doubtful quality sourced from diverse seed supply chain and poor quality of farm saved seeds are the important reasons for low productivity. The genetic gains of eighties and nineties in the seeds have decelerated. Varietal breakthrough and its dissemination is not keeping pace with country's varied requirements. There are **yield gaps** between the varieties available for different regions of the country. Significant breakthrough has not been achieved in development of varieties of pulses and the pulses are chronically trapped in the vacuum of good varieties of seeds to improve productivity. The varieties like PBW 343, evolved out of the process of pure line breeding some ten years back and contributed the wheat productivity in Northern States, covering about 80 percent of wheat area, has been showing signs of fatigue. No new variety has made inroads in the intervening period.
- (e) Constraints are highlighted on account of **delivery system of research**, though from ICAR's point of view, there are no constraints in research availability. But, there is a **decline in the role of public sector in seeds and its management**. The State Seeds Corporations are reportedly not functioning efficiently and several seed farms are either defunct or being disposed off.

- (f) **Seed production chain** from breeder seed to certified seed have serious gaps. Breeder seed is not multiplied into foundation and certified seed by the seed producing agencies like State Seeds Corporation and States' Department of Agriculture. Out of 15 State Seeds Corporations only a few Corporations are active and performing well.
- (g) One of the important causes for decline in crop production response to the application of inputs and technology is the **gradual degradation of soil**, the key factor for sustaining agriculture. The land and water taken together constitutes the soil and there are problems associated to both these soil components. On the available land there is a serious concern on degradation of soil in the major food basket regions. The imbalanced fertilizer consumption, without taking into account the soil needs and soil health is proving counter productive. The Indo-Gangetic belt, that had harboured the green revolution over decades of seventies and eighties, is now under serious stress on account of soil degradation, largely due to excessive use of nitrogen and indiscriminate water use in agriculture. Therefore, soil analysis has to be taken on priority to find the status of micro-nutrient and the requirement of fertilizers to supplement these deficiencies.
- (h) The **problems faced on irrigation** front has culminated into stress on water resources, falling water use efficiency, timely availability of water and increasing cost of irrigation. These factors are consequences of falling investment in agriculture and depreciation of capital stock in irrigation, besides the lack of awareness in farming communities to the aspects of conservation of natural resources and sustainable agriculture. The investment planning has to take note of the **steeply depreciating capital stock in agriculture**. There is a need for increasing the public investment by upgrading the ponds and existing irrigation channels, de-silting and adding community tube-wells and minor irrigation projects for improving water use efficiency in agriculture.
- (i) The stressed **water resources** directly reflect on the ground water depletion, incidences of farm tube wells going dry, burdening the farm household with huge

cost to reenergize the wells by deepening Resultant distress in farm economy is frequently witnessed. Attention is therefore required to be paid on efficient water use and the water systems. The efficient use of water is not only needed in the context of stressed water resources but is also warranted to enhance energy use efficiency and to control soil degradation caused by water logging. There has been increasing occurrences of **flood and droughts** mainly due to the lack of proper assessment of water system and water budgeting. There are apprehensions that recent floods in central and western India was due to improper planning, coordination and management of water releases from reservoirs. There were instances of crop damages due to coexisting draught and floods in close vicinities.

- (j) There are institutional issues linked to deceleration in agricultural growth and the foremost of these issues is the **slackness in the delivery of technology to the farmers**. It is noted that the extension machinery has collapsed in several parts of the country and there is a disconnect between the extension, research and development and market needs. The existing extension machinery is neither keeping itself updated with the evolved technology nor orienting to the diversified agricultural development. In this context, there is a trend of having greater reliance on media, particularly electronic media for the purpose of extension. There indeed is undoubted importance of information and communication technology in knowledge dissemination. However, these alternatives may not be able to substitute time tested front line demonstration system used by the extension machinery extensively in the past, particularly when a large segment of farmers are resource poor and do not have access to modern media systems.
- (k) The mission approach adopted for **oilseeds and pulses** had not yielded desired results, otherwise why the dependence on import of edible oil and pulses would have increased. These missions should have greater flexibility and adoptability to different regions and crops.

- (l) There have been concerns on availability of not only the quality seeds but the **quality inputs** also. There are reports that nearly 75 per cent of pesticides used by farmers are of poor quality and are spurious. As a result, the crop losses due to pests are high, and the farming is becoming a risky, costly and less remunerative proposition.
- (m) In the decades of eighties, the handsome productivity gains reflected on **farm efficiency** in terms of cost of production. The **declining factor productivity** is putting constraint not only on production response but also on the cost of production. This is squeezing relative income of farm households, their savings and resultant investment potential.
- (n) In the recent Plans the share of **private investment** in total investment in agriculture and this investment pattern is poised to be further strengthened in the 11<sup>th</sup> Plan. There possibly is no proper assessment on the nature and direction of private investment, its synergy with public investment and its quality. There is also data constraints to assess there dynamics in agricultural investments particularly disaggregated estimates of capital formation and capital stocks.
- (o) The national **food security** largely depends on production of rice and wheat and it has lately become vulnerable. The initiatives of **crop diversification** which is often articulated in the context of soil and water degradation in rice – wheat cropping system and focused on high value crops, appear to have not been properly dovetailed with the essence of food security crops. Any consideration for withdrawal of rice on account of soil degradation and water table depletion should be taken without damaging the paradigm of food security.

### **Inputs and Technology – Thrust Areas for Growth Sustainability**

5.3 For realizing the agricultural growth objectives of 11th Plan, particularly from the crop husbandry segment, the inputs have to play the most crucial role. The experiences of 9th and 10th Plan had firmed up the notion of **law of diminishing return in the agricultural sector**. The factor productivity of capital as well as labour has been diminishing. Besides, the cost of inputs has been increasing. This is seriously impacting the profitability in agriculture. It is not surprising that the Situation Assessment Survey conducted by the National Sample Survey Organisation (59<sup>th</sup> Round) revealed that

27 per cent of farmers found agriculture a non-profitable activity and as many as 40 per cent farmers opined that given an alternative, they would like to quit farming as a profession. To address these critical issues, the input management would require focused attention on **five core areas viz. seeds, nutritional management, water management, chemicals and management of energy.**

### Seeds:

5.4 The development of newer and improved seed varieties and effectively using the diversity of genetic pool and bio-technology had been instrumental in stimulating agricultural growth in the past. This **momentum of technology development and technology up-gradation needs to be sustained more vigorously for actualizing the potential of agricultural growth.** The infrastructure, scientific strength and expertise available with the crop research institutions of the country have to be re-energised and re-oriented for this purpose. This endeavour, besides introducing more advance seeds, would also require provision of seeds and the planting material in cost effective manner.

5.5 There had been substantial in-roads made by non-government agencies in seeds production and supply. **Private research** is also high priced. For example, there is substantial price difference in the price of B.T. cotton seeds and the seeds available from domestic research system. There are also reports that seed price is no guarantee for seed performance. This also brings to focus the **quality assurance of seeds.** There had been several reports of spurious seeds that either do not germinate or do not give desired yield and quality, causing serious economic losses to farmers. However, the cost of the seeds, its quality and production assurance had not been promising in many cases.

5.6 Need for refocusing on quality seed development and production to close the gap between production and requirement (which is about 91 lakh quintals) and to raise seed replacement rate to 25%, 33% and 100% for self-pollinated crops, cross pollinated crops and hybrids. National level seeds corporations, State Seeds Corporations, seed farms of State Governments and Universities will have to undertake large scale seed production to meet the gap in demand and supply of seeds.

5.7 The gaps between the results attained in the research institutions and at the farmers end are often attributed to inappropriate and inefficient farming practices in the field, not matching with prescriptions. Thus, the extension system has to be properly oriented to practices, specified for the varieties. In addition to the supply of good quality and cost effective seeds, it would also be necessary to ensure proper practices to be adopted by the farmers prescribed for particular varieties. The assurance of quality of seeds assumes greater significance in view of predominant seed supply from private sources. This would also necessitate proper and effective regulatory mechanism. Aforesaid discussion on seed development and its availability to farmers does not undermine the **role of farmers as seed producer**. There are success stories in farm produce seeds also. The integration of farmers and farmers groups in seed multiplication programme needs promotion.

#### **Nutritional Management:**

5.8 The declining factor productivity in Indian agriculture is partly attributed to the soil de-gradation, the main cause of that has been the **accumulating nutritional deficiency** over the years. One of the main factors for disturbed nutritional status of soil is the imbalance in the use of NPK in fertilizers. As already mentioned earlier, against the generalized recommended proportion of 4:2:1 of NPK, the aggregate national averages 7:2:1. There is a tendency of higher use of nitrogen (urea) by the farmers and in several instances, the phosphate and potash is not at all used. This tendency is more prevalent in the Indo-Gangetic belt devoted to high productivity of wheat and rice and where the **symptom of soil fatigue** due to nutritional imbalance are already evident. Besides, the production response to the fertilizers use is declining. There are also reports of ill affect on human health due to excessive intake of nitrogen in food chain in terms of high prevalence of blood pressure and blood sugar, even among young people, in Punjab and Haryana.

5.9 The imbalanced use of fertilizers by the farmers may not be solely attributed to the lack of his awareness on the aspect of soil health and its nutrition balance. There is distorting role of policy and management of fertilizers. The price and availability of Nitrogenous, Phosphates and Potash is also playing its role in dis-inclination of the

farmers to use them in a balance manner. The subsidized pricing of Nitrogenous fertilizers and reported deficit in the production capability of Phosphatic and Potash fertilisers are also instrumental in disturbing the nutrition balance of the soil over the decades.

5.10 The balanced use of fertilizers, however, can not be generalized to the entire agrarian space. It would depend upon the soil health and extent of imbalance to supplement proper nutrient ingredient through fertilizers use. Further, the nutrients have complementary and supplementary role in the production and vegetative growth, since use of one nutrient depends on the other as well as other inputs and practices of use. The farmers, when used to apply fertilizers in dry form may not be conscious to adopt soluble practices prescribed in some imported fertilizers. Besides these nutrients, other mineral deficiency such as Gypsum and Carbon content in the soil, also affect the fertilizer use efficiency. In the 11th Plan, therefore, the nutritional management should be one of the thrust areas. For this purpose **soil testing, distribution of soil health cards to all the farmers and creating awareness about on farm nutrition management** may need to taken in mission mode and efforts should be made to accomplish this in the very first year of the Plan so that its gains accrue in the subsequent plan period. Some of the states like Gujarat have demonstrated to accomplish the task of issuing soil health cards to all their farmers and there is need to replicate such efforts in other states. This should also be made integral element of all the extension activities.

### **Water:**

5.11 Water is the basic input for agricultural operations. The crop cycle depends upon weather cycle of rainfall along with that of temperature in different parts of the country. Though, the crop production in India is primarily rain dependent in terms of its acreage, the main production supply is from the irrigated areas. The irrigation is the single largest consecutive user of water attributing to 80 per cent of total water utilized. Out of 140 million hectare net sown area and 190 million hectare gross cropped area nearly 40 per cent is under irrigation which includes both assured as well as protective irrigation. Half of this is from ground water resources.

5.12 However, there are serious issues associated with **water use efficiency** in agriculture. The water is becoming a scarce input. The greater entrepreneurship of farmers, supported by subsidized electricity for agriculture makes ground water exploitation a more convenient option for irrigation. This phenomenon had already become evident in recent years. Given this scenario, the judicious use of water for water resources for agriculture and other competing demand is the need of the hour. The subdued rainfall precipitation over the year and indiscriminate exploitation of water is reflecting on depleting ground water resources in many parts of the country. For production of one Kg. of rice, 3000 litres of water is required.

5.13 Water being a State subject, the State Governments have primary responsibility for use and control of this resource. At the central level the Union Ministry of Water Resources is responsible for development, conservation and management of water as a national resource, i.e., for the general policy on water resources development and for technical assistance to the states on irrigation, multipurpose projects, ground water exploration and exploitation, command area development, drainage, flood control, water logging, sea erosion problems, dam safety and hydraulic structures for navigation and hydropower.

5.14 For sustained agricultural production, it is necessary to evolve **a well coordinated strategy to manage the use of water resources** such that (i) both surface and ground water supplies are maintained at desired level, and (ii) the quality of land and water resources does not deteriorate with time. With very low water use efficiency, the scarcity of water resources is also increasing its cost of extraction. Therefore, water budgeting and water use efficiency has to be given extra attention in the 11<sup>th</sup> Plan. It may also be noted that nutrient efficiency and the water use efficiency work in tandem. In recent years the cultivation practices such as Zero Tilling and raised bed cultivation have been propagated by Agricultural Research Institutions to enhance the efficiency in the use of both these factors of production. The agricultural development programmes as well as extension system have to assimilate these factors in their activities.

5.15 In the context of **irrigation infrastructure** creation and its management, the 11<sup>th</sup> Plan would require proper investment planning with four-fold focus, (a) the

replenishment of existing irrigation infrastructure, that has been depreciating over the years on account of various reasons (b) the unfinished projects to be completed on priority, (c) the creation of new irrigation projects and (d) ensure substantive increase in the cropping intensity in irrigated areas.

### **Chemicals:**

5.16 Like the use of micro-nutrients and water in agriculture, the chemicals are also used indiscriminately and un-judiciously. The use of un-prescribed pesticides in inappropriate doses is not only disturbing the soil conditions but is also destroying the healthy pool of bio-control agents that normally co-exist with the vegetation. These bio-control agents are the friends of agriculture and hence need to be nurtured, cared and developed by reducing the reliance on chemical's use in agriculture. The importance of bio-fertilisers in sustainable agriculture/organic farming in particular, is well known along with the need for promotion of the cheaper and eco friendly plant nutrient supplements.

5.17 Recognizing the importance of biofertilisers as a cost effective and environment friendly source of plant nutrients, the National Project on Development & Use of Biofertilisers was launched in 1983 during the 6<sup>th</sup> Plan and is continued for promoting the production and use of bio-fertilisers till 9<sup>th</sup> Plan and finally subsumed under a new Central Sector Scheme "National Project on Organic Farming". These efforts need to be sustained in 11<sup>th</sup> Plan. There is need for a national plan for bio control measures.

5.18 Considering the global concern of ill-effects of chemical pesticides, Integrated Pest Management (IPM), inter alia, aims at employment of alternate methods of pest control like cultural, mechanical and biological control in a compatible manner. The chemical control is resorted to when other control methods fail to provide desired results. It is ecologically safe and economical. It is noted that implantation of IPM itself is disintegrated as IPM component in different Plan schemes. Considering the importance of IPM, these fragmented elements need to be coordinated.

## **Management of Energy:**

5.19 The process of vegetative growth in essence is the transformation of energy. The energy made available through nutrients of the soil is simulated with the solar energy through the process of photo synthesis in combination with human, bullock, mechanical and other such energy supplements. The energy use efficiency would necessitate the change in its consumption and composition giving due consideration to preponderance of small and marginal farmers in the agrarian space.

5.20 One of the ways to enhance energy use efficiency is through **farm mechanization**. The farm mechanization is essential not only to save the energy but to transfer the energy efficiently for crop production. The agricultural development in the Punjab and Haryana is attributed to extensive farm mechanization. However, in eastern India, the progress of farm mechanization is very tardy. There is a demand supply syndrome. In eastern India, there are neither many manufacturers of farm machinery nor the services for repair and spare parts supply, whereas the agriculture of northern and north-west India has stimulated farm mechanization as an ancillary economic activity engaging large labour force outside agriculture and dependent on agriculture.

5.21 The substantial technological know-how is supposed to be available with different institutions dedicated to farm mechanization as well as with the agricultural universities and crop research institutions. There should not be constraint to have region and crop specific machinery of proven performance for their wide scale adoptability in the farming sector. One such study has already been completed by IASRI, ICAR on “Study Relating to Formulating Long Term Mechanization Strategy for Each Agro-Climatic Zone/State”. Absence of quality manufacturing of improved design of farm equipment in different parts of the country is proving to be an impediment in growth of farm mechanization. Promotion of quality manufacturing in different parts of the country needs to be promoted. State Agriculture Department also needs to be sensitized for extension of new technologies to farmers and also for obtaining feedback on new technologies required. These dimensions have to be given a special attention in the 11th Plan.

5.22 The importance of farm mechanization is to be seen in the context of demographic changes emerging in agrarian space. The studies have reflected gender issues in labour force participation in agriculture which is likely to witness female labour participation to go up from existing 30 percent to 45 percent. This shift is inevitable due to greater movement of male labour force in diverse occupational options. With this shift, the human energy supplementation by machine labour assumes further significance.

5.23 The energy use efficiency also needs to be viewed in the context of **use of power** for irrigation. According to Central Electricity Authority, the total electricity consumption during 2003-04 was 87089 million KWHs. This translates into about 620 KWH per hectare per annum corresponding to 140 million hectare net sown area. There is competing eagerness amongst farmers to apply tubewells disproportionate to the size of their holdings. This has serious consequences both on energy use as well as water use efficiency in agriculture. The formation of tubewell societies in villages will not only encourage water use efficiency, would also bring down energy consumption per hectare.

5.24 In nutshell, the elements of these **five thrust areas** that are required to be the focus for sustainable agricultural growth during 11<sup>th</sup> Plan are summed up as follows:

#### **1. SEEDS**

- **development of newer and improved seed varieties,**
- **effective use of diversity of genetic pool**
- **bio-technology**
- **Strengthening infrastructure, scientific strength and expertise**
- **cost of the seeds, its quality and production assurance**
- **Seed multiplication, seed farms, certification**
- **Defuse inappropriate and inefficient farming practices**
- **Seed Production by Farmers**

#### **2. NUTRITIONAL MANAGEMENT**

- **Curb Soil Degradation**
- **Restoration of Soil health (Carbon)**
- **Mission of Soil Testing**
- **Policy support for balanced use of fertiliser**
- **Rejuvenate fertiliser use efficiency**

- **Dovetailing with all extension activities**

### **3. WATER**

- **Efficient use of water**
- **Water Budgeting**
- **Appropriate cultivation practices**
- **Incentives and disincentives**
- **Irrigation Management – Four fold focus:**
  - Replenishment of existing irrigation infrastructure, that has been depreciating over the years on account of various reasons
  - Unfinished projects to be completed on priority,
  - Creation of new irrigation projects and
  - Ensure substantive increase in the cropping intensity in irrigated areas.

### **4. CHEMICALS**

- **Check indiscriminate and un-judicious use**
- **Control of un-prescribed pesticides**
- **Qualitative and quantitative issues**
- **Strengthening coordination and adoption of Integrated Pest management**
- **National Plan for Bio Control Measures**
- **Propagation of bio fertilisers**

### **5. MANAGEMENT OF ENERGY**

- **Enhance energy use efficiency in agriculture (Human, Bullock, Mechanical, Electrical etc.)**
- **Transform composition and consumption pattern**
- **Energy saving and energy transformation**
- **Rationalized farm mechanization**
- **Dovetailing research with propagation and adaptation**

5.25 The aforesaid five thrust areas of seeds, nutritions, chemical, water and management of energy provide the core issues that needs to be addressed for restoring the growth and sustainability of Indian agriculture. Besides these core issues, the agricultural development requires to assimilate certain other important aspects, which have being assuming significance in the contemporary economic environment in which agriculture has to survive. The 11<sup>th</sup> Plan reliance on demand stimulation is also based on **accelerating the agricultural exports** by 10 percent. This would necessitate putting in place the production system with post harvest infrastructure and procedures to meet the conditions of market access in different countries. The foremost among these conditions are cost competitiveness of production and adherence to Sanitary and Phyto-Sanitary (SPS) and other food and bio-safety requirements. Thus the research and development has to be dovetailed accordingly with production of exportable commodities compatible to the standards laid-down by the importing countries. This endeavour would also require detailed home work of dynamics of trade intelligence because these conditions vary from region to region and also change from time to time. This needs to be noted that the instruments of health and bio-safety, within the framework of WTO, are sometimes used as trade barriers. The objective of the **Cartagena Protocol on Biosafety** is to contribute to ensuring an adequate level of protection in the field of the safe transfer, handling and use of 'living modified organisms resulting from modern biotechnology' that may have adverse effects on the conservation and sustainable use of biological diversity, taking also into account risks to human health, and specifically focusing on transboundary movements. Accordingly, the similar bio-safety protocol for various commodities is also needed to be strengthened in respect of importable commodities.

**5.26 Integrated development of agriculture**, necessary for inclusive growth, has to take note of diversified growth covering crops, fisheries, livestock and on and off farm value addition. This approach alone can help in convergence of production resources for enhancing profitability and farm returns. One may also have to think alternatives for improving the farm returns such as infusing one cash crop in each village. There are positive results accruing to the farm economy by induction of market oriented production to the emerging demand in urban centers. Such village oriented model, backed by infrastructure, knowledge and market linkages can enhance efficiency in our agrarian economy.

## 6. Demand Supply Projection for 11<sup>th</sup> Plan

Assessment of demand and supply is one of the most crucial exercises for the planning process. The demand of commodities, particularly, agricultural commodities is linked to its requirement of final consumption by the population and / or intermediate consumption in the supply chain. The supply for the consumption requirement during the reference period gets sourced either from the domestic production, its net inventory from the carry over stocks or through imports, depending upon the capacity of domestic supply resources.

6.2 As discussed in Chapter-3, the agriculture sector during the 10<sup>th</sup> Plan experienced slackness in demand as well as supply, yet there was mismatch in supply and demand. This mismatch accentuated in the later part of the plan period, causing concern on the front of food security. Several factors, constraining supply have been identified as important causes for deceleration in the growth of agriculture. The externalities of climatic aberrations and market uncertainties were found to be further contributing to the supply inconsistency. Therefore, the supply front cannot be left to the Business As Usual (BAU) approach, and specific interventions dealt in Chapter-5 would be needed to augment supply, to reduce the eventualities of demand-supply mismatch and to quest for sustainable agricultural growth.

### **Methodological issues in Demand Projection**

6.3 Accordingly, the demand projections relate to dynamics of population and their consumption over time and space. These projections have been worked out in the planning process in the past as well as been updated / evolved by various organisations dealing with commodities and by various scholars from time to time using methodological framework and set of data and analysis.

6.4 For items such as foodgrains, oilseeds and sugarcane that mostly go for food consumption in its primary or primary processed form, is worked out following three different approaches.

- a) The **simplistic approach** to project the demand for the future is by using projection of population and the baseline consumption parameters. The periodically conducted Nationwide Household Consumer Expenditure Surveys by National Sample Survey Organisation (NSSO) provide detailed cross sectional estimates of per capita consumption separately for rural and urban areas for different commodities under foodgrains including rice, wheat, coarse cereals, pulses as well as oilseeds and sugar (including gur/khandsari) and the Mid Year projected population figures for 2001 upto 2026 are being brought out by the Registrar General of India (RGI). The 55<sup>th</sup> Round (1999-2000), of NSSO, are the latest available comprehensive survey results, that are considered in the present exercise. This approach assumes short term static behaviour of consumption and is also followed by the Commission for Agricultural Costs and Prices (CACP) for its near time demand and supply assessment of foodgrains, in particular, in the context of their agricultural price policy formulation.
- b) The **Normative Approach** to estimate the demand is based on the normative requirement of foodgrains, oilseeds and sugar/jaggery as recommended by National Institute of Nutrition, Hyderabad, and the projected population figures brought out by RGI.
- c) The third approach for assessing demand projections is the **Behaviouristic Approach** which is based on the growth of population and changing behaviour of consumption on account of changing per capita income in a growing economy, measured in terms of consumption / expenditure elasticity. The consumption parameter for the purpose may be relevant benchmark indicator either the end use per capita consumption or residual supply of per capita net availability. The consumption for the base year in the present exercise has been assessed on the basis of availability for actual consumption i.e. production, net imports and change in stock.

6.5 The second and third approaches given above were used in the earlier Five Year Plans for assessing the demand. As regards the assessment of demand for other commercial crops like cotton, jute & mesta, the above approaches are not applicable and

accordingly growth rate in the last five years in domestic/industrial consumption has been used for assessing the demand. As regards the demand for exports, the Working Group decided to use average of last three years for this purpose so as to take care of year to year fluctuations.

6.6 As per the 11<sup>th</sup> Plan Approach Paper and subsequent discussion, it is envisaged that the GDP would grow at 9% per annum, resulting in per capita income growth rate of 7.4% per annum after adjusting for population growth of 1.5% per annum. Though the per capita income and per capita disposable income would increase at the same rate if the later is deflated from the former by static saving rate over time, the studies have revealed that the growth of per capita food consumption at much slower rate due to incremental allocation of augmented income to non food consumption. Accordingly, the behaviorist demand assessment retained the per capita income growth at 4.8 % as the growth of per capita disposable income for food items. Based on the results of certain studies, the expenditure elasticity has been assumed to be 0.15% for cereals, 0.62% for pulses, as was done by the Working Group for 10<sup>th</sup> Plan and 0.55% for oilseeds and 0.82% for sugar & gur/khandsari

6.7 The ratio of **Seed, Feed & Wastage (SFW) is** used for translating consumption requirement to domestic production requirements and for converting the later in to net available for consumption. For the past more than a decade, SFW ratio is taken as 12.5% in various official assessments of net foodgrain availability. It may be mentioned here that the requirement towards seed, feed & wastage varies widely from crop to crop and State to State. With increase in productivity and greater awareness amongst farmers to control post harvest losses, the SFW ratio is expected to decline over time. However, the increased thrust to animal husbandry put higher demand for feed. Therefore, for the present report, this requirement was retained as 12.5% of the gross output as was done for the 10<sup>th</sup> Plan period for all the foodgrain crops except for rice for which this requirement has been taken as 7.6%.

6.8 Instead of SFW, different approaches are followed for oilseeds, sugarcane and fibres. For the oilseeds, a norm of 28% of gross output was used for oil recovery rate from oilseeds, seed, feed & wastage, consumption in secondary/supplementary sectors taken together as was done by the Working Group for 10<sup>th</sup> Plan on the suggestion of Ministry of Consumer Affairs, Food and Public Distribution. As regards sugarcane, a

norm of 11.67% was used for seed, feed & wastage (including chewing) based on information provided by Directorate of Sugar for the last six years ending 2002-03. For jute and mesta, seed, feed & wastage requirement has been taken as nil as suggested by the Jute Commissioner. However, for cotton a norm of 3% has been used only for wastage due to evaporation of moisture, micro dust, roller touch, gin jump etc as proposed by Cotton Corporation of India (CCI).

### **Demand Projections for terminal year of 11<sup>th</sup> Five Year Plan**

6.9 The Sub Group on Demand Supply derived alternative four scenarios, one each based on simplistic and normative approach and two for behaviorist approach, details are provided in Appendix – 2. . The demand projections given by the above mentioned approaches differ significantly because of different set of assumptions used for their estimation. In the household consumption approach and behaviouristic approach, it would be desirable to add the requirement for 7.8 million tonnes of foodgrain exports also. In case of foodgrains, the buffer stock as on 1<sup>st</sup> July 2006 was about 7 million tonnes less than buffer norms which would require to be restored in subsequent years. Considering this food security requirement, deficit in 2.0 million tonnes is added to the demand for augmenting the buffer stock, the requirement for which will also be higher for the terminal year of 11<sup>th</sup> Plan. However, under the normative approach, since the entire requirement will be met, there may not be any need to maintain buffer stock but export needs to be added. Keeping this in view, the foodgrains requirement under the three scenarios, namely, household approach, normative approach and behaviouristic approach, works out to 217 million tonnes, 244 million tonnes and 244 million tonnes respectively.

6.10 Similarly, in the case of oilseeds and sugarcane also, based on the behaviouristic approach, by 2011-12, the oilseed requirement works out to 53 million tonnes and sugarcane requirement works out to about 340 million tonnes, after taking into account an average export of about 5.5 lakh tonnes of sugar per annum and 12 lakh tonnes (1/4 of the three months requirement) for buffer. However, if the present level of imports is maintained in the case of edible oils at the present level, the production of about 36 million tonnes would be required to meet the demand by the end of 11<sup>th</sup> Plan.

6.11 In case of cotton and jute/mesta, no household consumption details are available from NSS reports. The NIN, Hyderabad, has also not brought out any norms for their consumption. Further, there are no details available about consumption behaviour for these crops. Therefore, the demand projections for cotton have been worked out based on the compound annual growth rate worked out using details provided by Cotton Corporation of India (CCI) relating to mill consumption for the period 2000-01 to 2005-06. Similar details in respect of jute & mesta have been worked out using the details provided by the Jute Commissioner in respect of mill consumption and domestic/industrial consumption for the period 2000-01 to 2005-06.

6.12 The Summary of plausible scenario of demand (in terms of gross production supply, at the terminal year of 11<sup>th</sup> Plan (2011-12) is given in Table below

Table 6.1 Demand Projections for terminal year of 11<sup>th</sup> Five Year Plan

Crop(s)	Demand in Million Tonnes
Cereal	224
Pulses	20
Total Food Grains	244
Oilseeds	53 / 36*
Sugarcane	322
Cotton	28.7 Million Bales of 170 KG Each
Jute and Mesta	9.87 Million Bales of 180 KG Each

\* If the present level of imports is maintained in the case of edible oils

### Supply Projections

6.13 The Sub Group on Supply and Demand delved on the issue of supply scenario of crop groups using different approaches viz. (a) based on Simple Regression Method, (b) Exponential Growth Method, (c) Multiple Regression Method taking irrigated area (barring jute & mesta where only two variables have been used), fertilizer consumption per hectare and crop area as independent variable, (d) Average Annual Growth rate Method and (e) Compound Annual Growth Method. The inferences from the alternative approaches are also given in Appendix 1.

6.14 First three of the aforesaid five methods are based on the growth trend of the

period 1995-96 to 2004-05 and provide the supply projections of foodgrains in the range of 214 to 223 million tonnes for the terminal year of 11<sup>th</sup> Plan. This projected supply level is the extension of BAU approach and is much lower than the demand projection of 244 million tonnes. The projection based on average annual growth during 10<sup>th</sup> Plan, though assesses supply in the terminal year of 11<sup>th</sup> Plan most optimistically at 240 million tonnes, still short of demand by 4 million tonnes, will be matching the demand by lowering the ambition of exports. The BAU approach, particularly in case of crop husbandry offers a not very pleasing scenario. In order to meet the demand, efforts would therefore be required to augment the supply during the 11<sup>th</sup> Plan and desirable rate of growth for foodgrains will at least be 2.3 % per annum to meet the objective of macro food security. The comparative scenario of demand and supply of agricultural crops falling in crop husbandry considered from various alternatives **for 2011-12** is summed up as follows:

6.15 The comparative position of demand projections based on Behaviorist Approach for 2011-12 for foodgrains, oilseeds, sugarcane and compound annual growth rate based last five years consumption for fibres are shown in the following table along with the range of supply projections based on compound annual growth rates of last five years production in respect of foodgrains and fibres. As regards oilseeds, the supply projections take into accounts the supply potential as well as accommodating the import substitution at existing level.

Table 6.2 Comparative Demand Supply Projections for terminal year of 11<sup>th</sup> Five Year Plan. (In million tonnes)

<i>Crops</i>	<i>Demand Projections for 2011-12</i>	<i>Range of Production Supply Projections for 2011-12</i>
<i>Foodgrains</i>	244@@	214 – 240 (from alternative methods)
<i>Oilseeds</i>	53	45.**
<i>Sugarcane</i>	340#	278-334 (from alternative methods)
<i>Cotton*</i>	29	16 – 50 (from alternative methods)
<i>Jute &amp; Mesta@</i>	10	11

\*Million bales of 170 kg each      @Million bales of 180 kg each  
 @@ includes 2 million tonnes for augmenting buffer stock and average export of 8

*million tonnes # includes 12 lakh tonnes for augmenting buffer stock and average export of 5.4 lakh tonnes of sugar \*\*The supply projections for oilseeds are based on realization of potential yield. This supply assessment would improve self sufficiency level in edible oils from existing 55% to 80%. However, if the level of edible oil imports to meet the domestic demand is assumed to be retained at present level (4.7 million tonnes), then the supply would require to be of 36 million tonnes of domestic production of oilseeds.*

## 7. Government Intervention for Agricultural Development

### Institutional Intervention in Agriculture

Agriculture is a complex economic activity. It is the largest private entrepreneurship engaging million of farmers and farm workers in about 125 million operational holdings (Farm Management Units), 80 percent of which are small and marginal ones and in several other activities of Animal Husbandry, Poultry and Fishing in and around these holdings. These activities, besides being dependent on several factors beyond human control such as climatic disturbances, are heavily dependent on several man made factors and are linked to other activities necessitating institutional interventions, support and delivery which cannot be otherwise arranged and organized by the numerous agricultural entrepreneurs, spread over the length and breadth of the country. These interventions cover a range of aspect, essential for agricultural development such as technology development delivery of inputs and support services, credit, marketing, infrastructure natural resource management, risk management, etc.

7.1 The constitutional provisions of the subject of agriculture in the “State List” in the federal structure, puts primary onus of public interventions on the respective state governments. However, this does not undermine the active involvement and commitment of union government on the issues that are extremely relevant in the pan national context such as formulating and implementing national policies and programmes, organising research and development, facilitating infrastructure and investment and institutionalization of these efforts in harmonious and coordinated manner, taking into consideration national perspective of agricultural development.

7.2 Accordingly, the three organs of Ministry of Agriculture viz. Department of Agricultural Research and Education (DARE), Department of Agriculture and Cooperation (DAC) and Department of Animal Husbandry and Dairying (DAHD) have specific functions and roles assigned (Annexure- 3 and 4 ). In the context of crop

husbandry, the roles assigned to DARE is mainly to look after all the aspects of agriculture research and education, all matters concerning development of new technology on production and natural resource management and the roles assigned to DAC are for formulation and implementation of national policies and programmes aiming to achieve agricultural growth through optimum utilisation of country's land, water, soil and plant resources, undertake measures for timely and adequate supply of inputs and services, undertake relief measures and institutional issues such as cooperatives are extremely relevant. The subject of statistics that falls under the "Concurrent List" of the Constitution makes the role of DAC important for collection, maintenance, developments and dissemination of agricultural statistics. The responsibilities of these two departments are also crucially important for establishing institutions, institutional linkages, procedures and standards in a harmonious and coordinated manners.

7.3 The decentralized structure of development interventions is not only over the states. The crucial elements of agricultural activities such as land, water, energy, nutrients (fertilizers) and genetic resources (seeds and plantations) are being looked into by different ministries and departments of central government, who coordinate development and interventions relating to their respective domains. The fiscal and trade policies are formulated by different central ministries also have bearings on agrarian economy. Thus the government initiatives and interventions for agricultural developments are set in a **matrix of horizontal and vertical layers of decentralization** across Ministries/Departments and States.

### **Budgetary Outlays of Central Departments**

7.5 The table 6.1 summarizes the budgetary outlay of three departments of Ministry of Agriculture for the financial year 2006-07, both in respect of Plan as well as Non-plan expenditure. The total plan outlay for the year 2006-07 of the three departments was Rs. 6977 crores, the largest share being that of DAC of Rs 4800 crores. At the outset, it needs to be noted that this outlay was for the sector having GDP contribution of 6.09 lakh crores for the year 2005-06 (current price). Thus the plan outlay was 1.15 percent of the sectoral GDP. The total outlay (Plan and Non-Plan) was 1.4% of agricultural GDP. It

may also need to be noted that some of the activities addressed by these plan schemes are outside the periphery of agriculture in the contribution to GDP of the sector. Simultaneously this outlay is not comprehensive for assessing the central developmental initiatives and interventions in the context if such interventions are also being taken by other departments and ministries for water management, land development, energy use and nutrient management etc.

Table 7.1: Budgetary Outlay of Ministry of Agriculture 2006-07

Departments	Budgetary Outlay in Rs. Crores (BE 2006-07)		
	Plan	Non-Plan	Total
DARE	1400	800	2200
DAC	4800	379*	5179
DAHD	777	269**	1046
Total	6977	1448	8425

\* includes Rs. 260 crores budget of NAFED

\*\* includes Rs 226 crores budget of Delhi Milk Scheme

7.6 Under the Plan expenditures, the departments implement various schemes and programmes in collaboration with the state governments classified as centrally sponsored schemes (CSS) and Central Sector Schemes (CS). The details of the Plan Schemes of DARE and DAC with the respective outlay for the year 2006-07 are given at Annexure-5 & 6. In respect of DARE, three schemes namely; Crop Science including seed production (Rs. 318 crore), Agricultural Extension (Rs. 270 crores) and Agricultural Education (Rs. 212 crores) accounted for more than 50% of annual plan outlay. The four other schemes (Horticulture, Natural Resource Management, Animal Science and National Agricultural Innovation Projects) share another 25% of total outlay leaving less than 25% plan outlay to be shared by other eleven schemes.

7.7 In case of Department of Agriculture and Cooperation, four schemes namely; National Horticulture Mission (Rs.1000 crores), Macro Management of Agriculture (Rs. 910 crores), National Agriculture Insurance Scheme (Rs. 500 crores) and Micro Irrigation (Rs. 520 crores) accounted for more than 60% of the total plan outlay. The residual, less than 40% of the plan outlay of DAC, was shared by 45 schemes covering diverse issues of crop development, horticulture, fertilizers, seeds, plant protection, mechanization and

technology, rain-fed farming system, natural resource management, credit, cooperation, extension, statistics and economics, agriculture sciences, agricultural marketing, information technology, trade, drought management, secretariat economics services, policy and plan. 15 out of these 45 schemes had annual outlay in single digit of Rs crore. However, it may need to be given a consideration that DAC is also sustaining number of institutional activities of national importance and for several activities its outlay is not matching with the requirement of thrust areas such as seed sector, plan protection, mechanization and technology, agricultural statistics and extension.

### **Budgetary Outlay of State Governments**

7.8 In the federal structure of the country, the state governments also undertake budgetary provisions for various activities to be pursued by them and accordingly allocate budgetary outlays for agriculture and allied activities. Table 6.2 gives the total budget outlay made by the states and Union Territories during 2005-06 for agriculture and allied activities, that also includes the allocation for wild life, food storage and warehousing, the components which are not covered under the subjects of departments under Union Ministry of Agriculture. Accordingly, the total adjusted outlay of all the states and UTs during 2005-06 was about 5600 lakh crores, which was 0.7% of agricultural GDP. Thus the relative budgetary allocation by the states was nearly 70% of total outlay of Central Government. The aggregate budgetary allocation of the states and the centre is about 2.2% of agricultural GDP. It is understood that a substantial part of this state outlay adjusts for proportionate expenditure stipulated from the state governments towards the allocation of funds for various Centrally Sponsored Schemes.

7.9 There is wide variability in developmental interventions (measured in terms of state budgetary outlay as percentage of state GDP for agricultural and allied activities) of the states (Annexure-5). In respect of Arunachal Pradesh, Chattisgarh, Goa, Himachal Pradesh, Jammu and Kashmir, Jharkhand, Karnataka, Manipur, Meghalaya, Nagaland, Sikkim, Tamil Nadu, Uttaranchal, Andaman and Nicobar, Chandigarh, Delhi and Pondicherry, this percentage for 2005-06 was higher than that in respect of budgetary

allocation of the departments under Union Ministry of Agriculture. These states are more proactive towards the development of agriculture in their respective states and it is also possible, by allocating proportionally larger share towards their agriculture, these states might be utilizing the allocation of CSS more effectively. However, most of the States, dominant in agriculture in National context have proportionately lesser outlay for Agriculture.

Table 7.2 Approved Annual Plan 2005-06 Outlays - States and UTs

(Rs. Lakhs)

<b>Heads of Development</b>	<b>Total Outlay of States and UTs (2005-06)</b>
1	2
<b><u>Agriculture &amp; Allied Activities</u></b>	
1. Crop Husbandry	220870.40
2. Horticulture	18937.94
3. Soil and Water Conservation (including control of shifting cultivation)	93253.65
4. Animal Husbandry	55922.44
5. Dairy Development	7561.29
6. Fisheries	25527.53
7. Forestry & Wildlife	181554.30
8. Plantations	5187.02
9. Food, Storage & Warehousing	1732.31
10. Agricultural Research & Education	39861.10
11. Agricultural Financial Institutions	6174.42
12. Cooperation	45505.33
13. <b><u>Other Agricultural Programmes :</u></b>	0
(a) Agriculture marketing	26208.77
(b) Others	13116.36
<b><u>Total - (I)</u></b>	741412.80
<b><u>Total - (I) less forestry and wildlife</u></b>	559858.60

7.10 As stated above, the intervention for agricultural development are decentralized across ministries, departments and states. In the process often an integrated assessment of different initiatives is missing. The comprehensive development of rural economy is attracting initiatives under rural development programmes (See Box) such as seed development by farmers in the homestead lands. These programmes requires synergies with agricultural research programmes for provision of good quality foundation seeds. The extension machinery also has to be oriented to provide appropriate knowledge to the

farmers associated with such programmes. The 73<sup>rd</sup> Amendment of Constitution has enabled the decentralization of agricultural development issues at Panchayat level. The strategies for agricultural development interventions therefore, would need the linkages with **Panchayati Raj Institutions**.

### **Employment Generation for Rural Folk Through Agri Enterprises**

#### **Establishment of Seed Processing Units, Horticulture and Forestry Nurseries & Silkworm Chawki Rearing Centres (CRCs) : A Special Project under Swarnajayanti Gram Swarozgar Yojana (SGSY)**

Sponsored by The Department of Rural Development, Govt. of India and Department of Rural Development & Panchyat Raj, Govt of Karnataka,

- To provide long term sustained Employment to the Rural poor and to bring them above the poverty line
- To train members of SHGs, farmers and rural youth to take up Micro Enterprises like Seed Production, Establishment of Nurseries and Silkworm Chawki Rearing Centers in the rural areas
- To extend market support by networking the institutions concerned and creation of information kiosks in all the clusters of the adopted villages

<http://sgsy.jssonline.org/>

## **7.10 Issues on schematic intervention by state and central government**

- a. The exercise of convergence of Central schemes was undertaken in the Tenth Plan and a number of schemes were restructured merging or bring under the umbrella of new schemes. However, in most cases, structure and focus of original schemes of the 9<sup>th</sup> Plan remained intact as the components of the modified schemes. Thus the merging did not serve the desired purpose of restructuring, reorientation and commensuration with the then emerging needs. Therefore, there is a need to further reexamine these schemes in the light of the changed agriculture scenario and experience of the utility of various components of the existing schemes.
- b. There are still a large number of schemes that can be merged and restructured. Some of the schemes have overlapping components. For example, the IPM may find place in different schemes, even in Horticulture Mission, but there is no mechanism of synergy and harmony of these schemes. Similarly, the scheme like Micro Irrigation

may lack cohesiveness with Crop Development Schemes, Technology Missions and / or the MMA.

- c. The merger of individual schemes into Macro Management of Agriculture (MMA) though is rationally valid to provide flexibility to States to orient its components as per their development priorities, but it would need to be assessed if certain components have low / least preference. Should such components be weeded out of the MMA?
- d. Considering the divergence in National perspective and the State perspective, as per flexibility provided in MMA, the Integrated Crop Development Programmes on Rice and Wheat be taken out of MMA and be put as a National Programme with focus on food security.
- e. The mechanism of Inter and intra state harmonization or synchronization of the 17 component schemes of MMA has also not been evolved. The monitoring of MMA is lacking. There is a need to re-look at the Macro Management Scheme to make it more effective. The monitoring mechanism of the schemes in the DAC needs to be strengthened .
- f. Several schemes are quite relevant from the point of view of institutional supports and institutionalisation of development initiatives, despite their small allocations. These initiatives can be bunched in the umbrella of institutional supports. This may concurrently need Divisional work orientation in the Departments to convergence.
- g. There is also need to synergise the development interventions of other Ministries and Departments to overall agricultural development. The initiatives .
- h. A large number of meetings are held with the State Governments for finalization of work plans under different schemes. It is suggested that State Government should be asked to prepare a State Agriculture Plan and State Horticulture Plan incorporating all the Schemes of DAC in their plan so that annual plans are discussed in one or two meetings with individual states. Such plans should be discussed in the last quarter of the financial year so that it can be effectively implemented from the first quarter of the ensuing year. The State Governments will also be knowing the total allocation under the agriculture sector for their states and accordingly they will make budgetary provisions in their respective budget for the forthcoming year.
- i Synergise agricultural research and development programmes with initiatives under

rural development programmes for comprehensive development of rural economy, such as seed development by farmers in the homestead lands.

j. The strategies for agricultural development interventions would need linkages with **Panchayati Raj Institutions.**

k. Some of the Schemes such as Natural Disaster Management have lost their significance and only a token provision of one crore is made for the activities of office expenses, professional charges etc. This can be included in the headquarter component.

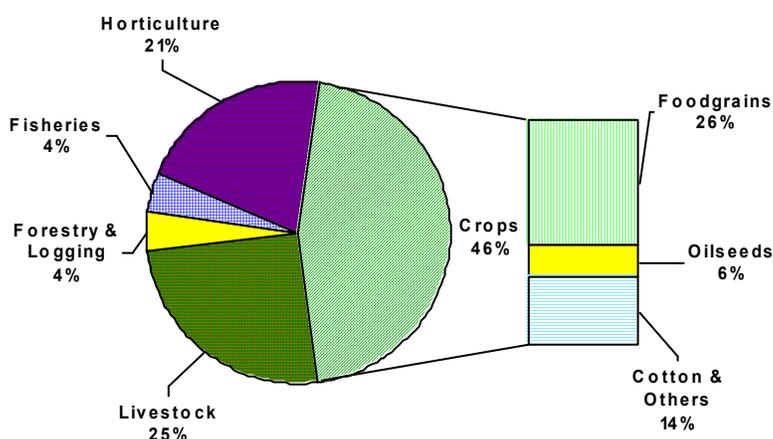
## 8. Eleventh Plan Growth Simulation

The preceding chapters of this Report have analysed the performance of Indian Agriculture and issues relating to deceleration of growth and identified thrust areas to usher a sustainable growth in the future, not only with a vision for the 11<sup>th</sup> Plan but beyond also. The Working Group has also examined various dimensions of supply potential from crop husbandry in consonance with the scenario of demand. Indian Agriculture has been passing through a critical phase of constraints of land resources, falling factor productivity, technology gap, investment deficiency and weakening response to interventions. However, these factors need to be addressed and overcome to realize the vision of 11<sup>th</sup> Five Year Plan of 4% growth from agriculture and allied sectors, dovetailing with its feasibility and desirability.

### Agricultural GDP Composition and Growth Potential

8.2 The examination of feasibility and desirability of growth necessitate the potential of growth by different sectors, the scope of resource allocation to these segments and the consumption and market consideration for absorbing the resultant augmentation of supply. The Chart – 8.1 gives the composition of agricultural GDP.

Chart 8.1 Agricultural GDP Composition 2003-04



The crop husbandry is the largest segment of the sector contributing 46% of GDP from

agriculture and allied activities. Within the crop husbandry the share is distributed amongst the foodgrains, oilseeds and other crops with 26%, 6% and 14% share respectively. The horticulture crops are part of agriculture and account for 21% of sectoral GDP. Thus the crops and horticulture together dominate the sector with 67% GDP contribution. The livestock sector encompassing animal husbandry, Dairying and Poultry share another 25% of GDP. The Fisheries and Forestry and Logging are relatively marginal segment of the sector with 4% contribution each.

8.3 As discussed in the sector growth retardation in the earlier chapters, the constraint of land resources is paramount. This constraint predominantly relates to crops and horticulture. There are crucial aspects of growth feasibility on account of constraint land resources. Firstly, the agriculture (crops and horticulture) are in net deficit of land resources taking into account overall demand. The rapid organization and competing demand for non-agricultural use is weaning away highly productive, irrigated land away from agriculture. The consistent import of 5 million tonnes of edible oil and about 2 million tonnes of pulses that has established in the recent years to meet the domestic demand translate into nearly 20 million hectares crop acreage requirement. Therefore, any growth in the crop husbandry sector can accrue through productivity enhancement. This growth has to take note of sustainability over or longer period and rider on over exploitation of soil nutrients and ground water.

8.4 The recent vulnerability of food security as reflected by the wheat production scenario of 2005-06 has further restricted the scope of diversion of land away from main stream crops of food security. Thus a substantial land diversion from crops to horticulture may not be a desirable proposition. Hence horticulture sector also may have to rely more on increase in productivity rather than on area for achieving its growth.

8.5 The livestock sector, though does not interfere much with agriculture on the intricacies of land resources, nevertheless in respect of fodder demand commensurating with high growth expectation, will compete for land in crop and animal husbandry.

## Growth Simulation

8.6 Taking into account issues relating to growth potential, commitment for food and nutrient security and differentiated demand and market efficiency to absorb, the simulation of achieving 4% growth from agriculture and allied sector, distributed over sectoral segments, is given in Table :

Table: 8.1 Simulation of Growth for 11<sup>th</sup> Plan

	<b>GDP Share %</b>	<b>Proposed Gr. Rate % per annum</b>
<b>Crops</b>	<b>46</b>	<b>2.70%</b>
<i>Foodgrains</i>	<i>26</i>	<i>2.3</i>
<i>Oilseeds</i>	<i>6</i>	<i>4.0</i>
<i>Other crops</i>	<i>14</i>	<i>3.0</i>
<b>Horticulture</b>	<b>21</b>	<b>5.0%</b>
<b>Livestocks</b>	<b>25</b>	<b>6.0%</b>
<b>Fisheries</b>	<b>4</b>	<b>6.0%</b>
<b>Forestry/logging</b>	<b>4</b>	<b>0.0%</b>
<b>Total</b>		<b>4.10%</b>

The silent considerations in the simulation are as follows:

- a. **There cannot be exceptionally high expectation of growth from crop husbandry** on account of various factors associated with production system and factors of production. However, the growth momentum can be energised and sustained at modest to moderate level in different crop segments.
- b. The growth simulation and the ambitions thereof balances the desirability of commitments to meet the demand and the potential for increasing the production on sustainable basis.

- c. The **foodgrain production** domain in northern India is already under stress on account of declining soil health, water deficit and falling factor productivity, putting riders on feasibility of accelerated growth. Therefore, in case of foodgrains where the consumption elasticity is lower, a **modest growth of 2.3%** is envisaged, more on the consideration of desirability than feasibility as this much of the growth is **must** for maintaining food security of the country.
- d. The **4 % growth oilseeds is desirable and feasible** in view of retaining the existing level of self sufficiency ( net of imports) and also substantial gap exists in potential and actual yield and issues of soil and water are not that alarming as in wheat, rice and sugarcane growing areas.
- e. The growth of domestic oilseed sector is also essential to maintain the **supply of cattle feed** concentrates from oil cakes, that can not be fulfilled by liberal imports of edible oil.
- f. Other crops are targeted to grow at **3% per annum**. In this basket there is potential in the productivity enhancement of cotton and sugarcane that can be tapped without conflicting with factor productivity.
- g. This would enable the **total crop husbandry segment to have growth at 2.70%**
- h. Given the land resource constrains and lesser scope of crop diversification, the horticulture sector may be targeted to grow at 5 percent. This moderate growth expectation acknowledges the ongoing efforts of National Horticulture Mission and in case of plantation horticulture, the maturity to fruit bearing stage would be three to five years.
- i. The livestock and poultry segments are pegged to grow at 6 percent and for forestry and logging, the growth expectation is kept “nil” as this segment should be maintained with status quo, in view of environment protection.

- j. The aggregated growth for the agriculture and allied sector, taking segment share as weights, will be 4.10 percent.

8.7 For refining the scope and feasibility of growth in crop husbandry, the Working Group suggests state specific strategy. The growth has to be mapped on the production space of different crops. The low productivity states hold the better potential of growth with proper intervention. To facilitate this mapping, Appendix 1-5 provide State wise productivity of important crops in ascending order along with National Average productivity. The States having productivity more than National Average are classified as A Category States and those less than National Average, B Category. There should be distinct focus for these two categories in the development programmes. The B Categories should be assigned the target to enhance their productivity at existing National average. In A Category each State should set the target to attain the productivity level of its next above State.

8.8 The **requirement of investment** for actualizing the growth would depend upon the Incremental Capital Output Ratio (ICOR). The capital efficiency in agriculture itself is varying over the components of the sector. Some segments may respond more positively than the others. The approach paper for the 11<sup>th</sup> Plan does not specifically mention about projected ICOR for agriculture. However, while targeting the 4% growth in agriculture sector, the 10<sup>th</sup> Plan document pegged the ICOR at 1.99 as against realized ICOR of 4.05 during the 9<sup>th</sup> Plan and 1.59 during 8<sup>th</sup> Plan. Thus, the 10<sup>th</sup> Plan expected the capital efficiency of investment almost double than that of 9<sup>th</sup> Plan. However, the expectation of 1.99 ICOR during 10<sup>th</sup> Plan will not happen as the agricultural growth in 10<sup>th</sup> plan is not likely to be higher than 9<sup>th</sup> plan and with augmented investment and slower growth, ICOR may exceed 4. Given the falling resource use efficiency in agriculture, one possibly can be optimistic on ICOR in 11<sup>th</sup> Plan, unless the resource allocation and their disaggregated efficiency and response is gauged. This could not be possible for the Working Group due to data constraints. However one may take note that 4% growth would mean the aggregated augmentation of agricultural value of output by about Rs. 30 thousand crore (current prices) annually or by Rs. 1.5 lakh crore during the plan period. Accordingly, the investment requirement will get translated, depending upon the assumptions of ICOR for agriculture and allied sector during the 11<sup>th</sup> Plan.

## 9. Agricultural Statistics

### **Background**

The complexities involved in any system are on account of the diversities prevailing in the domain and the dimensions of its coverage. Both these attributes abundantly exist in the agrarian economy of India. The redeeming feature of Indian agricultural statistics system is its coverage and its ability to modulate itself with the emerging needs of different periods.

9.2. The States generate basic agricultural statistics because the subject of agriculture is in the State List of the Constitution. However, the subject of statistics is under the Concurrent List of the Constitution of India. This enables the Central Government to take initiatives in this regard in the national perspective. The initiatives of the Central Government involve operating different schemes for improvement of agricultural statistics and adopting unified concepts and methodology, in the highly decentralized federal structure of the country. In spite of a well established system, these statistics have recently come under severe criticism both from within and outside the government for the lack of its reliability, timely availability and gaps therein.

### **The System**

9.3 The Directorate of Economics & Statistics (DES) in the Department of Agriculture and Cooperation (DAC) is the nodal official agency for collection, compilation and publication of major agricultural statistics. An overview of various schemes organized by the Department of Agriculture and Cooperation is Given in Annexure 7. On the basis of data received from the States, the DES generates area and production estimates for various crops, announces minimum support prices for various crops based on the results of cost of cultivation studies and recommendations of Commission of Agricultural Costs and Prices (CACP), brings out land use statistics based on nine-fold classification, compiles retail and wholesale prices for bringing out periodical bulletins and supply to the office of Economic Adviser for bringing out wholesale price indices, sponsors various agro-economic research

studies on subjects of current interest. The Market Intelligence generally flows as a by-product of agricultural marketing system and is coordinated by Directorate of Marketing and Inspection. Besides the agricultural statistics organized by DES, the DAC also conducts National Agricultural Census quinquennially, in collaboration with the States, providing details of land holding parameters and input statistics. The livestock census which is being conducted by the Department of Animal Husbandry, Dairying and Fisheries (DAHD&F) brings out, inter alia, statistics relating to agricultural implements and machinery as a part of the census results. DAHD also organizes the collection of Fisheries Statistics through specially designed survey. These range of statistics forms the basis for developing other macro indicators such as GDP and provide vital inputs for policy and decision making.

### **Review of Agricultural Statistics System**

9.4. The National Statistical Commission (NSC) had undertaken comprehensive review of the entire statistical system of the country and 10<sup>th</sup> Plan document envisaged implementation of its recommendations for Agricultural Statistics. The re-look of the present system of reporting of agricultural statistics and the recommendations of NSC it was noted that 55 recommendations of NSC related to entire gamut of agricultural statistics excluding fisheries and forestry statistics. The present status of implementation of these recommendations is given in the Annexure - 8. It was observed that the recommendations relating to crop forecasts have generally been implemented though the matter is being pursued with the State Governments for further improving the quality and efficiency of agricultural statistics data base and meeting training needs of the statistical officials involved.

9.5 The present status of implementation of various recommendations of the National Statistical Commission (NSC) clearly reflects that the implementation of these recommendations has not been taken seriously by the concerned organizations. **Various recommendations by the NSC are to be rigorously pursued and implemented at the earliest possible.**

9.6 The database for agricultural sector be thoroughly reviewed for its up gradation. The TRS Scheme, as well as, the ICS Scheme which are in vogue at present are in

operation I their format conceived four decades back and appear to have become a bit out dated and unless these schemes are thoroughly reviewed and revived, for bringing lasting improvement in the basic system of Agriculture Statistics,

9.7 It is, however, felt that with the introduction of National Agricultural Insurance Scheme (NAIS), the crop cutting experiments (CCEs) to be conducted has increased manifold without corresponding increase in the staff. Therefore, there is need to reduce the number of CCEs to be conducted by following the small area methodology developed by IASRI, New Delhi, or by adopting suitable rainfall based methodology or any other method based on past experience of drought and yield decline for estimation of yield at the village level of different crops. For meeting additional requirement of resources for this purpose, there is a need for taking up the matter with the Insurance companies concerned for financial support.

9.8 It was also noted that the Space Technology which is already being used for crop forecasts through Crop Acreage and Production Estimation (CAPE) project will further be extended by the new scheme for Forecasting of Agricultural Output using Space and Land Based (FASAL) project, approved by the Government in May 2006. The States will also be actively associated in this project.

9.9 One of the major weakness of agricultural statistics system is its inability to provide reliable and comprehensive statistics on horticulture, the sub sector that has been one of the drivers for inclusive and diversified agricultural growth. The Scheme for Estimation of Fruits and Vegetables has been in operation since 6<sup>th</sup> plan but is not yet stabilized. A pilot study had been entrusted to IASRI, New Delhi, for developing an alternative methodology for estimation of production of the horticultural crops as recommended by NSC. The study which is being conducted in two States, namely, Maharashtra and Himachal Pradesh, is likely to be completed by June 2007. However, the Working-Group felt that there is a need to explore the coverage of all the **horticultural crops for area estimation** under the Timely Reporting Scheme (TRS) also.

9.10 As regards the conduct of agricultural census by taking a sample of 20% villages and using an element of household enquiry, it was informed that DAC has constituted a Technical Committee to examine these issues. The Technical Committee will also look into the integration of livestock and agricultural censuses. As regards the introduction of Fourth phase to the existing three phase work in the agricultural census for providing the States with an opportunity for studying agrarian economy from regional point of view, the DAC felt that agro-economic studies involving concerned States may be identified and separate funds provided for this purpose under Agriculture Census in 11<sup>th</sup> Five Year Plan. Alternatively, the existing network of Agro-Economic Research Centres (AERCs) being funded by DAC may be involved to undertake the Agro-Economic studies.

9.11 There is a need to computerize the land records for facilitating sample selection for the census. The possibility of using details collected under **TRS for agricultural census** work also needs to be explored. Further, statutory backing needs to be provided to conduct the census within a given time frame. It was informed that the latter aspect was also being looked into by the Technical Committee constituted by DAC.

9.12 For improving collection and reporting of agricultural statistics in the North-Eastern Region (NE Region), the Sub-Group felt that the office of North-East Council may be made the coordinating agency for all the NE States.

9.13 It may be noted that the agricultural statistics becomes a more comprehensive decision support system when integrated with overall rural development statistics. These statistics are being collected by various departments, as noted while undertaking metadata exercise but are not being coordinated well in time for policy analysis. There appears to be weak mechanism of maintaining rural development statistics which is so essential to judge the potential and performance of the agricultural sector. It is recommended that to actualize the 11<sup>th</sup> Plan vision of

broad based and inclusive growth, **an integrated system for rural and agricultural statistics** be put in place to facilitate planning and development of diversified rural economy of which agriculture is the key component.

**File No. M-12043/10/2006- Agri**  
**Government of India**  
 Planning Commission  
 (Agriculture Division)

Yojana Bhavan, Sansad Marg,  
 New Delhi, dated: 9<sup>th</sup> June, 2006

**ORDER**

**Sub.: Constitution of Working Group on Crop Husbandry, Agricultural Inputs, Demand and Supply Projections and Agricultural Statistics for the Eleventh Five Year Plan (2007-12)- Regarding**

In pursuance of P.C. Division circular No. M-11016/4/2005-PC dated 21<sup>st</sup> December, 2005 it has been decided to set up a Working Group on Crop Husbandry, Agricultural Inputs, Demand and Supply Projections and Agricultural Statistics, in the context of preparation of XI<sup>th</sup> Five Year Plan.

2. The composition of the Working Group is as under:

(i)	Prof. V.S. Vyas, Chairman, Institute of Development Studies , 8B, Jhalana Institutional Area, Jaipur 302 004.	- Chairman
(ii)	Dr. M. Mahadevappa, Former Vice- Chancellor, University of Agricultural Sciences, Dharwar, 1576, 1 <sup>st</sup> Cross, Chandra Layout, Bangalore-560 040.	- Member
(iii)	Prof. J. George, Chief Promoter, Strategic Economic Management Initiatives in Governance, (SEMIG) Chair, Faculty of Economics and Development Planning (FEDP), Haryana Institute of Public Administration, 76, HIPA Complex, Sector-18, Gurgaon-122001	- Member
(iv)	Dr. S.M. Jharwal, Principal Adviser, Department of Agriculture and Co-operation, New Delhi.	- Member
(v)	DDG, Crops, ICAR, Krishi Bhawan, New Delhi.	- Member
(vi)	Dr. N.B. Singh, Agricultural Commissioner, Department of Agriculture and Co-operation, New Delhi.	- Member
(vii)	Dr. Praduman Kumar, Prof. & Head (Retired), Agri. Economics, IARI, New Delhi.	- Member
(viii)	Joint Secretary (Seeds), Department of Agriculture and Co-operation, New Delhi.	- Member
(ix)	Joint Secretary (INM), Department of Agriculture and Co-operation, New Delhi.	- Member
(x)	Joint Secretary (Fertilizers), Department of Agriculture and Co-operation, New Delhi.	- Member
(xi)	Plant Protection Adviser, Department of Agriculture and Co-operation, New Delhi.	- Member

(xii)	Joint Secretary (Farm Implements and Machinery), Department of Agriculture and Co-operation, New Delhi.	- Member
(xiii)	Director, Central Institute of Agricultural Engineering, Bhopal.	- Member
(xiv)	Dr. R.S. Doahrey, former Addl. Commissioner (Farm Machinery)	-Member
(xv)	Joint Secretary, Department of Fertilizers, New Delhi	- Member
(xvi)	Dr. S.D. Sharma, Director, IASRI, New Delhi.	- Member
(xvii)	Prof. Ramesh Chandra, Director, NCAP, ICAR New Delhi	- Member
(xviii)	Shri Deep Joshi, Executive Director, PRADHAN, 3, Community Shopping Centre, Niti Bagh, New Delhi.	- Member
(xix)	DDG, NSSO, Patel Bhawan, New Delhi	
(xx)	DDG, CSO (National Accounts), Patel Bhawan New Delhi	- Member
(xxi)	Adviser (Agricultural Statistics), Directorate of Economic and Statistics, Department of Agriculture & Cooperation, New Delhi.	- Member
(xxii)	Director (Agriculture Census), DAC, New Delhi.	- Member
(xxiii)	Agriculture Secretary, Government of Madhya Pradesh, Bhopal.	- Member
(xxiv)	Agriculture Secretary, Government of Haryana, Chandigarh.	- Member
(xxv)	Agriculture Secretary, Government of Karnataka, Bangalore.	- Member
(xxvi)	Agriculture Secretary, Government of Orissa, Bhubaneshwar.	- Member
(xxvii)	MD, National Seeds Corporation.	- Member
(xxviii)	Executive Director, National Horticulture Board, Gurgaon.	- Member
(xxix)	General Manager, NABARD, Mumbai.	- Member
(xxx)	Shri S.S. Prasad, Joint Secretary, National Commission on Farmers.	-Member
(xxxi)	Shri K. Varadharajan, Gen. Secretary, All India Kisan Sabha, 4, Ashok Road, New Delhi.	-Member
(xxxii)	Smt. Rugmini Parmar, Director, Plan Finance-II Division, Department of Expenditure.	-Member
(xxxiii)	Adviser (Agriculture), Planning Commission.	-Member
(xxxiv)	Dr. Rajiv Mehta, Member- Secretary, Commission for Agricultural Costs and Prices, New Delhi.	-Member-Secretary

3. The **Terms of Reference (ToR)** of the Working Group will be as follows:

### **Crop Husbandry and Inputs**

- (i) To study and analyze the trends in growth rate of agricultural sector, agricultural productivity, investment in agriculture sector and farmers' income and suggest policy initiatives and other interventions required to increase these.
- (ii) To review the performance of the central sector and centrally sponsored schemes/programmes implemented by the Department of Agriculture and Cooperation during the Tenth Plan with reference to their objectives and targets and to suggest modifications, if to be continued, so as to make these programmes more effective.

- (iii) To assess the demand and supply of fertilizers, seeds, and other inputs during the XI Five Year Plan and the suggest measures to meet the demand.
- (iv) To assess the impact of the various programmes on increased/adequate availability and optimum use of agricultural inputs specially water, seeds, fertilizers/ bio-fertilizers, plant protection measures including bio-control agents and bio-pesticides and suggest measures to improve their supply/availability and ways to ensure quality control of inputs including fertilizers, organic manures and bio-fertilizers.
- (v) To assess the extent of farm mechanization and suggest strategies for its promotion, also covering small farm implements.
- (vi) To suggest measures for judicious management of inputs to achieve higher use efficiency and to effectively address issues concerning adverse impact of imbalanced/ excessive input use and over-exploitation of natural resources on environment.
- (vii) To suggest measures/programmes for increasing the production of foodgrains, oilseeds, commercial crops to maintain the food security and self sufficiency.
- (viii) To study the declining priority in the expenditure on agriculture and allied sectors by the States and the Central Government, suggest ways to augment it and recommend on the division of responsibility of agricultural development between the Centre and the States.

### **Demand Supply Projections**

- (ix) To work out the requirement of foodgrains, oilseeds, sugarcane, cotton, jute and other commodities including their demand for export, domestic use and make the supply projections for the terminal year of the Eleventh Five Year Plan for the purpose of working out physical targets of agricultural production.

### **Agricultural Statistics**

- (x) To review the present system of reporting of agricultural statistics, re- look on the recommendations of the National Statistical Commission, suggest measures to improve the quality and efficiency of agricultural data-base and identify training needs of the statistical officials.
- (xi) To suggest measures to improve collection and reporting of agricultural statistics in the North East Region.
- (xii) To examine introduction of fourth phase to the existing three phase work in agricultural census so as to provide the States with an opportunity to study in-depth a subject of agrarian economy important from regional point of view.

- (xiii) To examine the case for legislation for agricultural census on the lines of Census Act.
4. The Working Group may co-opt any other official/ non-official expert/ representative of any organization as member(s), if required.
  5. The Working Group may examine and address issues which are important but are not specifically spelt out in the ToR. The Working Group may devise its own procedures for conducting its business including meetings.
  6. The expenditure of the members on TA/DA in connection with the meetings of the Working Group will be borne by the Ministry/ Department/ State Government to which they belong. In case of non-officials, the TA/DA will be borne by the Planning Commission as admissible to the Class-I Officers of the Government of India.
  7. The Working Group will submit its interim Report by July, 2006 and final by September, 06.
  8. Shri Surinder Singh, Director (Agriculture Division), Room No. 229-C. Yojana Bhawan, New Delhi-110001, will be the nodal officer for this working group for all further communication. (Tel. No. 23096758, E-mail surinder@yojana.nic.in)

(Surinder Singh)  
Director (Agriculture)

To

1. The Chairman and all the Members of Working Group on Crop Husbandry, Demand and Supply Projections, Agricultural Inputs and Agricultural Statistics for the Eleventh Five Year Plan (2007-12)

Copy to:

1. P.S. to Deputy Chairman / Minister of State (Planning)/Members/Member Secretary, Planning Commission.
2. All Pr. Advisers/Advisers, Planning Commission
3. Prime Minister's office, South Block, New Delhi.
3. Cabinet Secretariat, Rashtrapati Bhawan, New Delhi.
5. Information Officer, Planning Commission.
7. Secretary, D/o Animal Husbandry, Dairying & Fisheries.
8. Secretary, D/o Agriculture & Cooperation.
9. Secretary, D/o Agricultural Research & Education.
10. Secretary, M/o Food Processing Industry.
11. Secretary, D/o Fertilizers
12. Secretary, D/O Commerce
12. P.C. Division, Planning Commission.
13. Accounts-I Branch, Planning Commission.

(Surinder Singh)  
Director (Agriculture)

## FUNCTIONS

### **The Department of Agricultural Research And Education (DARE)**

The Department of Agricultural Research And Education (DARE) coordinates and promotes agricultural research & education in the country. DARE provides the necessary government linkages for the [Indian Council of Agricultural Research \(ICAR\)](#), the premier research organisation with a scientific strength of over 6000 and a countrywide network of 47 Institutes including 4 deemed to be University status, 5 National Bureaux, 31 National Research Centres, 12 Project Directorates, 89 All India Coordinated Research Projects and 38 Agriculture Universities spread all over the country.

DARE is the nodal agency for International Cooperation in the area of agricultural research and education in India. The Department liaises with foreign governments, UN, CGIAR and other multilateral agencies for cooperation in various areas of agricultural research. DARE also coordinates admissions of foreign students in various Indian agriculture universities/ ICAR Institutes.

#### **The major functions of DARE are :**

- To look after all aspects of the agricultural research and Education(including horticulture, natural resorces management, agriculture engineering, agricultural extension, animal science, economic statics and marketing and fisheries) involving coordination between the central and state agencies.
- To attend all matters relating to Indian Council of Agricultural Research.
- To attend all matters concerning the developement of new technology in agriculture, horticulture, natural resorces management, agriculture engineering, agricultural extension, animal science, economic statistics and marketing and fisheries, including such functions as plant and animal introduction and exploration and soil and land use survey and planning.
- International co-operation in the field of agricultueal research and education including relations with foreign and international agricultural research and educational institutions and organisations, including participation in international conferences, associations and other bodies dealing with agricultural research and education and follow-up decisions at such international conferences etc.
- Fundamental, applied and operational research and higher education including co-ordination of such research and higher education in agriculture including agroforestry, animal husbandry, dairying, fisheries, agricultural statistics, economics and marketing.

### **Functions of The Department of Agriculture and Cooperation**

The Department of Agriculture and Cooperation is responsible for the formulation and implementation of National policies and programmes aimed at achieving rapid agricultural growth through optimum utilization of the country's land, water, soil and plant resources.

The Department undertakes all possible measures to ensure timely and adequate supply of inputs and services such as fertilizers, seeds, pesticides, agricultural implements and also to provide agricultural credit, crop insurance and ensure remunerative returns to the farmer for his agricultural produce.

The Department is entrusted with the responsibility for collection and maintenance of a wide range of statistical and economic data relating to agriculture, required for development planning, organizing agricultural census, assisting and advising the States in undertaking scarcity relief measures and in management of natural calamities e.g. flood, drought, cyclone etc.

The Department is responsible for the formulation of overall cooperative policy in the country, matters relating to national cooperative organizations, cooperative training and education. The Department also participates in activities of international organizations, for fostering bilateral cooperation in agricultural and allied sectors and for promotion of export in agricultural commodities.

**Statement of Budget Estimates (Plan)****Ministry of Agriculture/Department of Agricultural Research and Education.**

Schemes/Programmes

Annual Plan 2006-07 (BE)

## Central Sector Schemes

CROP SCIENCE including Seed Production in Agril. Crops and Fisheries (Rs. 133.5 cr. Other than NEH and Rs 4.50 crores NEH Component during 2006-07	318
HORTICULTURE	70
NATURAL RESOSURCE MANAGEMENT including CSWCR&IT, Dehradun (Rs. 3.60 cr. And Rs 81.40 crore for other schemes during 2006-07	85
AGRICULTURAL ENGINEERING	40
ANIMAL SCIENCE	85
FISHERIEIS	30
AGRIL. ECO. & STATISTICS	4
AGRICULTURAL EXTENSION	270
AGRICULTURAL EDUCATION	212
DARE	0.5
CENTRAL AGRI. UNIVERSITY	55
MANAGEMENT AND INFORMATION SERVICES	25
National Fund for Strategic Research	50
Indo US Knowledge Initiative	5
National Agricultural Technology Project	0
National Agricultural Innovation Project	100
National Agricultural Research Project	50
Indo French Seabass	0.5
<b>TOTAL</b>	<b>1400</b>

**Schemewise Approved Outlays for Annual Plan 2006-07**  
**Department of Agriculture & Cooperation**  
**(Rs Crores)**

Name of the Division/Scheme	Annual Plan 2006-07	
	Budget Estimate (BE)	Outlay Earmarked for North - Eastern States (10% of BE)
2	3	4
<b>Crops</b>	<b>275.00</b>	<b>2.00</b>
Technology Mission on Cotton-ICDP Cotton (CSS)	74.00	2.00
Enhancing Sustainability of Dryland Rainfed Farming Systems (CSS)	200.00	
Jute Technology Mission - Mini Mission II (New Scheme)	1.00	
<b>TMOP</b>	<b>278.00</b>	<b>2.50</b>
National Oilseeds and Vegetable Oils Development Board (NOVOD) including Tree Borne Oilseeds and Bio-diesel (Jatropha Plantation).	8.00	
Integrated Scheme of Oilseeds, Pulses, Oil Palm and Maize (ISOPOM) (CSS)	270.00	2.50
<b>Horticulture</b>	<b>1951.00</b>	<b>240.60</b>
National Horticulture Board (including Cold Chain)	100.00	15.00
Coconut Development Board including Technology Mission on Coconut	40.00	
Technology Mission on Horticulture for NE Region including Sikkim Uttaranchal, HP and J&K (CSS)	205.40	150.00
Micro Irrigation (CSS)	520.00	
National Mission on Bamboo Technology and Trade Development (CSS)	80.00	70.00
National Horticulture Mission (CSS)	1000.00	
Central Institute of Horticulture in Nagaland (New Scheme)	5.60	5.60

<b>Fertilisers</b>	<b>30.40</b>	<b>4.50</b>
National Project on Fertilizer Quality Control	3.40	
National Project on Promotion of Organic Farming	27.00	4.50
<b>Seeds</b>	<b>105.00</b>	<b>5.00</b>
Scheme for Implementation of Protection of Plant Varieties and Farmers' Rights' Act 2001	10.00	
Restructuring of National Seed Corporation and State Farm Corporation of India (NSC & SFCI)	5.00	
Development and Strengthening of Infrastructure Facilities for Production and Distribution of Quality Seeds	90.00	5.00
<b>Plant Protection</b>	<b>43.00</b>	<b>1.50</b>
Strengthening and Modernisation of Pest Management in Country	16.00	1.50
Strengthening and Modernisation of Plant Quarantine Facilities in India	17.00	
Monitoring of Pesticide Residues at National Level	10.00	
<b>Mechanisation &amp; Technology</b>	<b>11.00</b>	<b>1.50</b>
Promotion and Strengthening of Agricultural Mechanisation through Training, Testing and Demonstration	11.00	1.50
<b>Rainfed Farming System</b>	<b>1.35</b>	
Watershed Development Council	1.35	
<b>Natural Resource Management (NRM)</b>	<b>11.00</b>	
All India Soil and Land Use Survey	11.00	
<b>Credit</b>	<b>550.00</b>	<b>6.00</b>
Investment in Debenture of State Land Development Banks (SLDBs)	50.00	5.00
National Agricultural Insurance Scheme (NAIS)	500.00	1.00
	<b>100.00</b>	<b>7.00</b>

<b>Cooperation</b>		
Cooperative Education and Training	65.00	3.00
Assistance to NCDC for Development of Cooperatives	35.00	4.00
<b>Extension</b>	<b>225.65</b>	<b>30.00</b>
Extension Support to Central Institutes/Directorate of Extension (DOE)	13.65	1.00
Support to State Extension Programmes for Extension Reforms (CSS)	75.00	8.00
Agri-Clinics/Agri-Business Centres	11.00	1.00
Mass Media Support to Agriculture Extension	126.00	20.00
<b>Directorate of Economics and Statistics (DES)</b>	<b>63.00</b>	<b>3.40</b>
Studies in Agricultural Economic Policy & Development	27.00	2.00
Forecasting and Remote Sensing Application in Crop Husbandry	5.00	
Improvement of Agricultural Statistics (CSS)	27.00	1.40
Forecasting Agricultural Output using Space, Agro-Meteorology and Land Based Observation (FASAL) (New Scheme)	4.00	
<b>Agriculture Census</b>	<b>14.50</b>	<b>2.00</b>
Agriculture Census	14.50	2.00
<b>Agriculture Marketing</b>	<b>183.20</b>	<b>2.00</b>
Marketing Research Surveys and Information Network (MRIN)	3.55	
Grant-in-aid to National Institute of Agricultural Marketing (NIAM)	3.50	
Strengthening Agmark Grading and Export Quality Controls	1.15	
Development of Market Infrastructure, Grading and Standardisation	67.00	
Gramin Bhandran Yojana	70.00	2.00
Small Farmers' Agri Business Consortium (SFAC)	38.00	
<b>Information Technology (IT)</b>	<b>37.50</b>	<b>1.00</b>
Strengthening/Promoting Agricultural Information System	37.50	1.00

<b>Trade</b>	<b>1.00</b>	
Capacity Building to Enhance Competitiveness of Indian Agriculture (New Scheme)	1.00	
<b>Drought Mangament (DM)</b>	<b>0.20</b>	
Natural Disaster Mangement	0.20	
<b>Secretariat Economic Service</b>	<b>8.55</b>	
Secretariat Economic Service	8.55	
<b>Macro Management</b>	<b>910.00</b>	171.00
Macro Management of Agriculture (CSS)	910.00	171.00
<b>Policy and Plan</b>	<b>0.65</b>	
National Commission on Farmers	0.65	
<b>Sub-Total</b>	<b>4800.00</b>	<b>480.00</b>
<b>State Plan Scheme</b>		
Watershed Development in Shifting Cultivation Area in North Eastern States		
<b>Total</b>		

## State wise Outlay for Agriculture and Allied activities 2005-06

State/UT	Total Agri. and Allied outlay (lakh Rs.)	Outlay% of Agri SGDP
1. Andhra Pradesh	38632.68	0.694
2. Arunachal Pradesh	7137.49	13.037
3. Assam	15870	1.163
4. Bihar	10295.84	0.522
5. Chattisgarh	25925.74	3.818
6. Goa	4664.5	7.737
7. Gujarat	43229.3	1.760
8. Haryana	6496	0.349
9. Himachal Pradesh	9598.32	1.997
10. J & K	22458.3	4.401
11. Jharkhand	12690	1.605
12. Karnataka	82155.25	3.786
13. Kerala	18846	1.409
14. Madhya Pradesh	24371	0.921
15. Maharashtra	28355.91	0.811
16. Manipur	1455.77	1.524
17. Meghalaya	5592	5.474
18. Mizoram	6383	15.360
19. Nagaland	5028	4.238
20. Orissa	3944.53	0.225
21. Punjab	6107.51	0.208
22. Rajasthan	10083.52	0.355
23. Sikkim	2284	7.280
24. Tamil Nadu	52941	2.568
25. Tripura	4979	3.462
26. U.P.	76069	1.091
27. Uttranchal	10288.64	2.402
28. West Bengal	10613.3	0.239
29. A & N Islands	2285.97	6.342
30. Chandigarh	85	1.478
31. Dadra & Nagar haveli	353	
32. Daman & Diu	237	
33. Delhi	1854	2.243
34. Lakshdweep	915	
35. Pondicherry	7633	34.229

**SCHEMES ON AGRICULTURAL STATISTICS OPERATED BY  
DIRECTORATE OF ECONOMICS & STATISTICS / DAC**

The Directorate of Economics and Statistics (DES), an attached office of the Department of Agriculture and Cooperation (DAC), is responsible for collection, collation, dissemination and publication of statistics on diverse facets of agriculture and allied/related sectors required for policy formulation. The Directorate of Economics and Statistics has been implementing various Central Sector / Centrally Sponsored Plan Schemes. Keeping in view the need to adopt a holistic approach for the objectives, 3 Umbrella Schemes were introduced from 10<sup>th</sup> Plan. Scheme-wise details regarding the financial and physical performance are given as under:

**1. Improvement of Agricultural Statistics**

“Improvement of Agricultural Statistics” scheme comprising four on going Centrally Sponsored components namely (i) Crop Estimation Survey on Fruits and Vegetables (ii) Timely Reporting of Estimates of Area of Principal Crops (iii) Improvement of Crop Statistics and (iv) Establishment of an Agency for Reporting of Agricultural Statistics. The component-wise details are as under:

**(i) Crop Estimation Survey on Fruit, Vegetable and Minor Crops (CES- F&V)**

With the objective to generate estimates of area and production of major fruits and vegetables in the country, this component is being implemented in 11 States. Regular crop estimation survey of 14 fruit/vegetable viz. Apple, Mango, Citrus, Pineapple, Grapes, Banana and Guava & Potato, Cabbage, Cauliflower, Onion, Tomato, Ginger and Turmeric crops are being conducted in various States. On the basis of the data generated under the Scheme, Statistics required by the Central Statistical Organization (CSO) in connection with compilation of National Accounts Statistics were furnished to them for the year 2003-04. A new methodology as suggested by the National Statistical Commission for alternative cost effective methodology is under process to cover all important fruit and vegetable crops in all the major States for reliable estimates of area and production at all India level.

**(ii) Timely Reporting on Estimates of Area and Production of Principal Crops**

The primary objective is to obtain reliable estimates of area of principal crops with break up of area under irrigated/unirrigated categories and traditional/high yielding varieties of crops on the basis of priority enumeration for Kharif and Rabi season for generation of advance estimates of area/production of principal crops. This component is being implemented in 16 States and two Union Territories.

**(iii) Timely Reporting on Estimates of Area and Production of Principal Crops (TRS)**

The primary objective is to obtain reliable estimates of area of principal crops with break up of area under irrigated/unirrigated categories and traditional/high yielding varieties of crops on the basis of priority enumeration for Kharif and Rabi seasons for generation of advance estimates of area/production of principal crops.

#### **(iv) Improvement of Crop Statistics (ICS)**

This is for conducting sample check of the area enumeration and crop cutting experiments at the harvest stage. These checks relate to (i) enumeration of crop wise area covered (ii) total of the area under each crop recorded (iii) yield differentials based on crop cutting experiments at the harvest stage. It is being implemented in all 16 States and some UTs of Pondicherry where Timely Reporting Component is in operation. The Central Supervision under ICS Scheme is carried out by NSSO with budgetary outlay of Ministry of statistics and Programme Implementation.

#### **(v) Establishment of an Agency for Reporting of Agricultural Statistics (EARAS)**

The main objective is to generate the estimates of area and production of principal crops and land use statistics at a regular interval in the permanently settled states of Kerala, West Bengal and Orissa where no land revenue system exists. Based on the priority enumeration work, the estimates of area of all principal crops for k

## **II. Scheme of Studies on Inputs for Agricultural Economic Policy and Development**

### **(i) Comprehensive Scheme for studying the cost of Cultivation of Principal Crops in India**

The detailed cost related data are collected through 16 agricultural / general universities / college in India. Besides, Directorate of Tobacco Development, Chennai also collects data relating to cost of VFC Tobacco in Andhra Pradesh.

The purpose of the scheme is to collect cost related data as per specified sampling design to generate estimates of cost of production of important crops which are used by Commission for Agricultural Costs and Prices (CACP) for recommending Minimum Support Prices for agricultural commodities. Under the scheme, the cost data are collected from various clusters and a sample of 10 operational holdings from each selected cluster is studied for disaggregated cost of cultivation.

Under the scheme, grants-in-aid are released to the Implementing Agencies (IAs) located in Agricultural/General Universities/College for collection and compilation of field data on cost of cultivation/ cost of production.

### **(ii) Planning and Management of Agriculture:**

The Central Sector Plan Scheme was formulated during 1998-99 to organize workshops, hold consultations with eminent agricultural experts/scientists., sponsor studies on status of policies/regulations etc. and also animal husbandry sector. Based on the recommendations of the workshops / consultations etc. studies papers/ reports are brought out to formulate agricultural policies, plans and programmes etc.

This scheme included provision for Millennium Study on the State of Indian Farmers that would form the basis of the policy formulation for a long-term perspective. It was originally envisaged that the Millennium Study would consist of three phases. However, EFC decided in its meeting held on October 27, 2003 that phase-III need not be pursued. Accordingly, it would now have only two phases.

Phase-I involving preparation of around 25 Reports on different facets of agriculture by well-known experts in the respective areas has been completed. Work on phase II involving a countrywide survey on farmers (covering 0.60 lakhs farmers), which was entrusted to the National Sample Survey Organisation (NSSO), is in the last phase of completion and some of the reports of survey have been received in the Ministry. The Millennium Study which was commissioned during the terminal year of the Ninth Five Year Plan came to an end.

**(iii) Strengthening of Agricultural Statistics & Agricultural Policy Formulation (Plan Scheme)**

The objective of this central sector plan scheme is to strengthen the system of agricultural statistics and policy formulation by strengthening of research techniques and up-gradation of skills of personnel involved in the compilation and analysis of data. During the year 2005-06, a National Workshop on Improvement of Agricultural Statistics was held on 1<sup>st</sup> & 2<sup>nd</sup> July 2005. This Workshop was attended by representatives of State Governments, Union Ministries, Agricultural Research institutions, etc.

**(iv) Agro-Economic Research Scheme**

The objective of the Regional Centres for Agro-Economic Research Scheme is undertake research/evaluation studies on Agro-Economic problems of the country which are of interest to the Central and State Governments. Twelve (12) Agro-Economic Research Centres and three (3) Regional Units are located in different parts of the country and are attached with their respective Universities/Institutions. A.E.R. Centres undertake studies on regional basis, while the 3 Units viz (1) IEG-Delhi (2) CMA-Ahmedabad (3) ISEC-Bangalore undertake studies of inter-regional and all India relevance.

**(III) Forecasting and Remote Sensing Application in Crop Husbandry**

The Central Sector Umbrella Scheme viz Forecasting and Remote Sensing Applications in Crop Husbandry during the Tenth Five Year Plan includes following three components.

- National Crop Forecasting Centre (NCFC)
- Crop Acreage and Production Estimates (CAPE)
- Special data Dissemination Standards (SDDS)

The umbrella scheme of Forecasting and Remote Sensing Application in Crop Husbandry comprising three ongoing components of NCFC, CAPE and SDDS was implemented with effect from 1.8.2004.

Through these activities, the umbrella Scheme strives to reap the benefits from Remote Sensing (RS) and other modern technologies in the area of crop forecasting. The purpose is to reconcile, cross check and validate data from all other existing/available sources so as to reduce the time lag and increase reliability in the forecasting of area and production under different crops.

**(I) National Crop Forecasting Centre (NCFC)**

NCFC was created at the end of the year 1998 and was set up mainly with the following functions:-

- i) Periodic crop forecasting for major crops, and
- ii) Coordination and assimilation of various methodologies and technical advancement relating to crop forecasting.  
However, over the time, its sphere of activities has been expanded to:
  - a) Providing effective unified institutional framework for the entire crop forecasting system in the country involving data flow, assimilation, analysis and dissemination of statistics.
  - b) Periodic crop forecasting for major crops through assimilation of information generated by the different organizations such as IMD, Medium Range Weather Forecasting of Department of Science & Technology, Department of Space (DOS), Central Statistical Organization (CSO), Indian Agricultural Statistics Research Institute (IASRI), Field Operations Division of the National Sample Survey Organization (NSSO) and the State Agriculture Statistics Authorities (\*SASAs), State Agriculture Departments etc.
  - c) Coordination and assimilation of various methodologies and technical advancement relating to crop forecasting.
  - d) Central level monitoring of the situation about crop, weather, water, supply of inputs, pests/diseases and related aspects through the mechanism of Crop & Weather Watch Group in the Department of Agriculture & Cooperation.
  - e) Providing a forum for the Standing Technical Committee on Agricultural Statistics to review and monitor the development of the methodologies for crop forecasting in particular and Agricultural Statistics in general, which has already been constituted as a follow up of the recommendation No. 8 of the Expert Group
  - f) Coordinating the proposed projects/scheme on “Development and Application of Extended Range Forecast System for Climate Risk management in Agriculture (ERFS)” and “Forecasting of Agriculture output using Space, Agro-meteorology and Land based observations (FASAL)”.
  - g) During the Ninth Plan, the professional posts envisaged for NCFC could not be created and NCFC operated by ad-hoc deployment of professionals with a truncated mandate.

**(ii) Crop Acreage and Production Estimation (CAPE)**

The activity was initiated during the Seventh Five Year Plan as one of the components of the Scheme named “Remote Sensing Application Mission for Agricultural Application” (RSAMAA). The Scheme was initially monitored by the Crops Division, but later on, it was transferred to Directorate of Economics and Statistics. From 2004-05, this has been merged with the umbrella scheme Forecasting and Remote Sensing Application in Crop-Husbandry. This activity is being fully funded by the Ministry of Agriculture and executed under the overall

technical guidance of the Department of Space, Ministry of Science and Technology, Government of India, with the help of State Remote Sensing Application Centres (SRSAC's), State Department of Agriculture (SDA), Directorate/Bureau of Economics & Statistics (DES's ) and State Agriculture Universities (SAU's). It aims at the estimating crop acreage and yield, with the application of RS Technology, at least a month before the actual harvesting of crops. In this process, it enables development and upgradation of methodologies in consonance with state of art RS technology and sensor capabilities for crop inventory assessment at different geographical units. As the advance estimates of area and production of crops are required for taking a policy decision on procurement, storage and pricing measures, remotely sensed data has an immense potential in timely monitoring the crop acreage and production at district/group of districts/ regional levels due to its wide area synoptic coverage. Using the remotely sensed data at the peak vegetative stage of crops, it is possible to give pre harvest estimates of crop acreage at the right time.

Under the CAPE activity, area and production estimates based on remote sensing technology have been prepared for specified crops for the selected States/Districts during the year 2005-06. Grants-in-aid are provided to Space Application Centre, Ahmedabad for operationalising the activities under CAPE.

### **(iii)Special Data Dissemination Standards (SDDS)**

Under this activity, quarterly estimates of agricultural production are generated for use in the compilation of Quarterly National Accounts by the Central Statistical Organization. This activity has been undertaken in order to meet the obligations concerning supply of data to the International Monetary Fund. The estimates of quarterly crop production generated are being furnished to the Central Statistical Organization. In the absence of direct data, quarterly production is estimated by using the estimates of Kharif and Rabi seasons in conjunction with crop calendar.

In order to improve upon the quality of quarterly estimates by way of refining the estimation procedure and cross validation of results, available data from other sources such as Timely Reporting Scheme, Market Intelligence Unit of DES and National Sample Survey Organization etc. are used. This is a staff oriented activity under the umbrella scheme.

### **Forecasting Agricultural Output using Space, Agro-Meteorology and Land based observations (FASAL)**

The existing system of agricultural statistics, inspite of established procedures and wide coverage, has inherent limitations in the matter of providing an objective assessment of crops at the pre-harvesting stages with desired spatial details, which are essential to identify problem areas and intervention required. However, capabilities of the existing system of crop forecasts and crop estimation can be enhanced with introduction of technological advancements and the adoption of emerging methodologies. Remote Sensing (RS) and Geographic Information System (GIS) can be used towards this end.

The concept of Forecasting Agricultural Output using Space, Agro-Meteorology and Land based observations (FASAL), seeks to strengthen the current capabilities of early season crop estimation capabilities from econometric

and weather based techniques with RS applications. The FASAL project envisages to institutionalize the diverse use of remote sensing in agriculture with special focus on crop inventory assessment.

The proposal of FASAL is jointly conceptualized by the DAC and Department of Space and is proposed to be a new scheme during Tenth Five Year Plan.

The primary focus of the FASAL project is to strengthen the crop output assessment, which in essence is periodic crop inventory. However, it is also conceived as an umbrella project with potential use of Remote Sensing and GIS techniques to address the diverse information needs of Agriculture Sector such as long term resource planning and assessment of episodic events.

## **AGRICULTURE CENSUS**

Agriculture Census is a Centrally sponsored scheme with 100 percent financial assistance. Agricultural Census is conducted quinquennially in the country for collection of data on structure of operational holdings by different size classes and social group. Agricultural Census is the largest countrywide statistical operation undertaken by Ministry of Agriculture, Govt. of India. Primary and secondary data on structure of Indian agriculture are collected under this operation using the machinery of the State governments. The first Agricultural Census in the country was conducted with reference year 1970-71. So far six Agricultural Censuses have been completed at five yearly intervals and the seventh one is in operation in the country. The Census is carried out in three Phases. During Phase-I, a list of all the holdings with data on primary characteristics like area, gender and social group of the holder and its location code etc. are prepared. During Phase-II detailed data on irrigation status, tenancy particulars, cropping pattern, number of crops taken etc. are collected. Phase-III, popularly known as Input Survey, relates to collection of data on pattern of input use across various crops, regions and size groups of holdings.

Government of India meets all the expenses concerning the scheme. Grants are paid to the States/UTs to meet the expenses related to the schemes.

**Status of Implementation of Recommendations of National Statistical Commission (NSC)**

<b>S.No.</b>	<b>NSC Recommendation</b>	<b>Status of Implementation</b>
(1)	(2)	(3)
<b>Agricultural Statistics (excluding Fisheries and Forestry Statistics)</b>		
<b>Crop Forecasts (Para 4.4.8)</b>		
1.	As the data from a 20 per cent sample is large enough to estimate crop area with a sufficient degree of precision at the all-India, State and district levels, crop area forecasts and final area estimates issued by the Ministry of Agriculture should be based on the results of the 20 per cent Timely Reporting Scheme (TRS) villages in the temporarily settled States and Establishment of an Agency for Reporting Agricultural Statistics (EARAS) scheme villages in the permanently settled States. In the case of the North-Eastern States, Remote Sensing methodology should be used for this purpose after testing its viability.	This recommendation stands implemented as regards crop area forecasts and final area estimates based on 20% sample villages. Further, the “ <b>FASAL</b> ” project, inter-alia, envisages application of remote sensing technology in the north-eastern States.
2.	The <i>patwari</i> and the supervisors above him should be mandated to accord the highest priority to the work of the <i>girdawari</i> and the <i>partwari</i> be spared, if necessary, from other duties during the period of <i>girdawari</i> .	The matter is being pursued with State Governments on a regular basis.
3.	The <i>patwari</i> and the primary staff employed in Establishment of an Agency for Reporting Agricultural Statistics (EARAS) should be imparted systematic and periodic training and the fieldwork should be subjected to intensive supervision by the higher-level revenue officials as well as by the technical staff.	We agree that training and intensive supervision is necessary. The matter is being pursued with State Governments on a regular basis.
4.	For proper and timely conduct of the <i>girdawari</i> , the concerned supervisory staff should be made accountable.	The matter is being pursued with State Governments on a regular basis.

5.	Timely Reporting Scheme (TRS) and Establishment of an Agency for Reporting Agricultural Statistics (EARAS) scheme should be regarded as programmes of national importance and the Government of India at the highest level should prevail upon the State Governments to give due priority to them, deploy adequate resources for the purpose and ensure proper conduct of field operations in time.	The matter is being pursued with State Governments through meetings of High Level Coordination Committees at State Level and status reports of NSSO prepared under ICS scheme
6.	In view of the importance of reliable estimates of crop production, the States should take all necessary measures to ensure that the crop cutting surveys under the General Crop Estimation Survey (GCES) are carried out strictly according to the prescribed programme.	The matter is being pursued with State Governments on a regular basis.
7.	Efforts should be made to reduce the diversity of agencies involved in the fieldwork of crop cutting experiments and use as far as possible agricultural and statistical personnel for better control of field operations.	The matter is being pursued with State Governments on a regular basis.
9.	The two series of experiments conducted under the National Agricultural Insurance Scheme (NAIS) and the General Crop Estimation Survey (GCES) should not be combined for deriving estimates of production as the objectives of the two series are different and their merger will affect the quality of general crop estimates	As per the provisions of the NAIS, the implementing States/UTs are required to maintain yield data on single series for both crop insurance and crop production estimates based on requisite number of crop cutting experiments. As the source of the two series may be different which may lead to different results for both the series, this may lead to confusion among the farmers. Therefore, it has been provided in the scheme to maintain single series of yield data for determining district level estimates at present and using Small Area Methodology for assessing yield

	.	at lower level. The methodology of Small Area Approach is being pilot tested at present. However, this methodology is to be developed for EARAS States as the existing methodology developed by IASRI is not applicable in permanently settled states. We are in touch with IASRI for developing an alternative methodology suitable for permanently settled states.
11.	The Ministry of Agriculture and the National Crop Forecasting Centre (NCFC) should soon put in place an objective method of forecasting the production of crops.	The FASAL project which has provision for additional staff for NCFC has been approved by the Government in May, 2006. The proposal for sanction of additional staff by Ministry of Finance is now being prepared.
12.	The National Crop Forecasting Centre (NCFC) should be adequately strengthened with professional statisticians and experts in other related fields.	As shown against S. No. 11 above.
13.	The programme of Forecasting Agricultural output using Space, Agro-Meteorology and Land based observations (FASAL), which is experimenting the approach of Remote Sensing to estimate the area under principal crops should be actively pursued.	The space technology is already being used in agriculture under Crop Acreage and Production Estimation (CAPE) project. The Government has approved the FASAL project in May 2006 and it will be implemented in six years.
14.	The States should be assisted by the Centre in adopting the objective techniques to be developed by the National Crop Forecasting Centre (NCFC).	The scheme envisages support and implementation at State Level also.

<b>Land Use (Para 4.7.7)</b>		
15.	The methodology adopted in the pilot scheme of “Crop Estimation Survey on Fruits and Vegetables” should be reviewed and an alternative methodology for estimating the production of horticultural crops should be developed taking into account information flowing from all sources including market arrivals, exports and growers associations. Special studies required to establish the feasibility of such a methodology should be taken up by a team comprising representatives from Indian Agricultural Statistics Research Institute (IASRI), Directorate of Economics and Statistics, Ministry of Agriculture (DESMOA), Field Operations Division of National Sample Survey Organization (NSSO (FOD)) and from one or two major States growing horticultural crops. The alternative methodology should be tried out on a pilot basis before actually implementing it on a large scale.	A pilot study had been entrusted to IASRI for this purpose. The study is being conducted in two States viz. Maharashtra and Himachal Pradesh and is likely to be completed by June 2007.
16.	A suitable methodology for estimating the production of crops such as mushroom, herbs and floriculture needs to be developed and this should be entrusted to the expert team comprising representatives from Indian Agricultural Statistics Research Institute (IASRI), Directorate of Economics & Statistics, Ministry of Agriculture (DESMOA), Field Operations Division of National Sample Survey Organization (NSSO(FOD)) and from one or two major States growing these crops.	A pilot study for developing a suitable methodology for estimating the area and production of floriculture had been completed by IASRI with financial support from Ministry of Statistics & Programme Implementation.

17.	The nine-fold classification of land use should be slightly enlarged to cover two or three more categories such as social forestry, marshy and water logged land, and land under still waters, which are of common interest to the Centre and States and which can easily be identified by the <i>patwari</i> through visual observation.	Action has been initiated in consultation with the States. However, in order to proceed further, clear definition of each of the three categories vis-a-vis the existing nine-fold classification of land is required. For this purpose, a committee of officers drawn from DES, Ministry of Environment & Forests, CSO, State Governments, NSSO and IASRI has been setup.
<b>Land Holdings and Agricultural Census (Para 4.9.13)</b>		
19.	In view of wide variation between the irrigated area generated by the Ministry of Agriculture and the Ministry of Water Resources, the State Governments should make an attempt to explain and reduce the divergence, to the extent possible, through mutual consultation between the two agencies engaged in the data collection at the local level.	Ministry of Water Resources had set up a Task Force for preparing guidelines for reporting the figures of irrigation potential created and utilized in a uniform manner. The Task Force which had representatives from CWC, M/o Water Resources, M/o Agriculture, State Depts. of Irrigation and State Directorates of Economics & Statistics as Members/Special Invitees had submitted its report inter-alia recommending setting up of coordination committees at state and district levels for this purpose. The matter is being pursued with State Govts. for implementation of the report.
20.	The State Directorates of Economics and Statistics (DESSs) should be made the nodal agencies in respect of irrigation statistics and they should establish direct links with the State and Central agencies concerned to secure speedy data flow.	We agree with the recommendation and will pursue it as shown against S.No.19 above.
23. & 24	The Agricultural Census should henceforth be on a sample basis and the same should be conducted in a 20 per cent sample of villages.  There should be an element of household enquiry (besides re-tabulation) in the Agricultural Census in the temporarily settled States.	The DAC have constituted a technical committee to examine these proposals.

25.	Computerisation of land records should be expedited to facilitate the Agricultural Census operations.	Action is called for on the part of Ministry of Rural Development.
26.	There should be adequate provision for effective administrative supervision over the fieldwork of Agricultural Census and also a technical check on the quality of data with the help of the State statistical agency.	Adequate provision has been made keeping in view the design of Agricultural Census.
27.	The post of the Agricultural Census Commissioner of India at the Centre should be restored and should be of the level of Additional Secretary to be able to interact effectively with the State Governments. Further, this post should be earmarked for a senior statistician.	The administration division of the Ministry is processing the case for this purpose.
28.	The Census Monitoring Board should be revived to oversee the Agricultural Census operations.	No further action required. Already a Steering Committee is performing this job.
<b>Agricultural Prices (Para 4.10.10.)</b>		
29.	The Ministry of Agriculture should prepare a well-documented manual of instructions on collection of wholesale prices of agricultural commodities.	A well-documented manual of instructions on collection of wholesale prices of agricultural commodities was re-circulated to States as a reminder to adhere to prevailing guidelines.
30.	The agricultural price collectors should be given thorough training in the concepts, definitions and the methods of data collection, and the training courses should be repeated periodically.	Agriculture price collectors are under the control of State Governments and there is no budgetary provision available with the Directorate of Economics & Statistics to train the State Government functionaries. However, the State Governments are addressed from time to time for conducting training/refresher courses for the agricultural price collectors.
31.	Workshops and training courses should be made an integral part of quality improvement. The quality of data should be determined on the basis of systematic analysis of the price data of agricultural commodities both by the Centre and the States.	

32.	Latest tools of communication technology like e-mail should be availed of to ensure timely data flow of agricultural prices.	Directorate of Economics & Statistics is already using e-mail etc. for rapid flow of data/information, however a customized software is being developed by the National Informatics Centre (NIC). After the development of the software, the price reporters should be properly trained so that the data is sent in the format provided by the DES and there is a direct transmission from the agencies collecting the data to the website of the Ministry of Agriculture in the same way as it is being done under the <u>agmarknet</u> by the Directorate of Marketing & Inspection through the State Marketing Agencies.
33.	A system should be developed to secure a simultaneous data flow of agricultural prices from lower levels to the State as well as the Centre.	The State Governments have been requested to provide computer at various levels so that the software being developed can be used to feed the data from different levels where the prices are collected. Though the software would be provided by the Central Government, the hardware would have to be provided by the State Governments.
34.	The State agencies at the district level and below should follow up cases of chronic non-response relating to collection of data on agricultural prices.	The Directorate regularly communicates with the State Governments by requesting them to improve the quality and flow of data to bring down the non-response to the minimum.
35.	The number of essential commodities for which agricultural prices are collected should be reduced to an absolute minimum, especially the non-food crops, in consultation with Ministry of Consumer Affairs and Cabinet Committee on Prices.	The matter to examine the need for continuation of existing number of essential commodities, price collection centres and other relevant issues is under consideration.
36.	The centres of agricultural price collection should, as far as possible, be the same for the essential commodities as those for wholesale prices.	

<b>Agricultural Market Intelligence (Para 4.11.4)</b>		
37.	The functions, activities and the staff requirements of the Agricultural Market Intelligence Units should be re-evaluated and appropriate measures taken to streamline the units.	The staff requirements, as also the functions and activities of the M.I. Units, are under consideration for which comments of the different user Ministries had been sought.
<b>Cost of Cultivation of Principal Crops (Para 4.12.6)</b>		
38.	In view of the importance of the Cost of Cultivation Studies in the price administration of agricultural commodities and several studies relating to farm economy, the present programme should continue.	Being continued. No further action required.
39.	Focused attention should be paid to the proper organisation and management of the Cost of Cultivation Studies.	In pursuance of the decision of the Expenditure Finance Committee, Department of Agriculture and Cooperation had constituted an Inter Ministerial Committee (IMC) to restructure the Comprehensive Scheme on Studying the Cost of Cultivation of Principal Crops in India. The IMC has since submitted its report which is under implementation.
40.	A review of the number of centres, methodology, sample size, the existing schedule and questionnaire, etc. of the Cost of Cultivation Studies should be undertaken.	An expert Committee under the chairmanship of Prof. Y.K. Alagh had been constituted to look into the Methodology in the Fixation of Minimum Support Prices. This committee had since submitted its report which is under consideration of the Government.

41.	The Directorate of Economics and Statistics, Ministry of Agriculture (DESMOA) should minimise the delay in bringing out the results of the Cost of Cultivation Studies.	Earlier, there used to be some delays in generating estimates of cost of cultivation. Of late, delays have been substantially reduced by persuading implementing agencies to adhere to time schedule. The due date of submission of cost of cultivation data for the preceding year by the implementing agencies has been set at September 30. On receipt of data from implementing agencies, high priority is accorded by DES to the work relating to thorough scrutiny, processing etc. Whenever any clarification etc. is required from the implementing agencies, it is done on priority basis. After processing/cleaning of data, the estimates of cost of cultivation/ production of rabi crops are transmitted to CACP for their inclusion in Price Report – Rabi Season. Subsequently, the cost of cultivation/ production of kharif crops are also transmitted to CACP for their inclusion in Price Report – Kharif Season. With reference to the Price Report of Rabi and Kharif seasons, there is one year and two years time lag for the Rabi and Kharif crops respectively which are minimum time lag and therefore at present there is no delay as such.
<b>Integration of Livestock and Agricultural Censuses (Para 4.14.3)</b>		
42.	The quinquennial livestock census should henceforth be taken in a 20% sample villages instead of a cent per cent coverage.	As shown against S.No. 46, 47.
45.	IT should be used at various stages of Livestock Census.	It is being done since Livestock Census, 2003.

46. & 47.	<p>The Livestock and Agricultural Censuses should be integrated and taken together in a 20 per cent sample of villages.</p> <p>Before effecting the integration of Livestock and Agricultural Censuses a limited pilot investigation be undertaken to firm up the procedures of integration.</p>	<p>The Department of Agriculture &amp; Cooperation and the Department of Animal Husbandry, Dairying and Fisheries hold the view that, prima facie, such an integration may not be feasible. However, action is being taken as shown against Sr.No.s, 23 &amp; 24.</p>
48.	<p>The periodical National Sample Survey Organisation's survey on land and livestock holdings be synchronised with Agricultural and Livestock Censuses in order to supplement as well as help in the cross check of information from the two sources.</p>	<p>No further action required by DAC. NSSO and Department of Animal Husbandry, Dairying and Fisheries have been requested to synchronize the dates of their surveys with that of Agricultural Census which is done at every five-year interval, coinciding with the end of a decade.</p>
<b>Marketable Surplus and Post-Harvest Losses (Para 4.18.4)</b>		
53.	<p>The States should improve the recording of area under still water by appropriate modification of land use statistics.</p>	<p>As shown against S.No.17 above.</p>
60.	<p>The existing methodology in conducting the surveys on marketable surplus and post-harvest losses of food grains should continue in future surveys of this type.</p>	<p>No further action required.</p>
61.	<p>The agencies designated for the collection of information on marketable surplus and post-harvest losses of food grains should be provided additional manpower, wherever necessary, for the conduct of these surveys.</p>	<p>The additional manpower requirement of agencies designated for collection of information on marketable surplus and post-harvest losses of commodities undertaken for survey will be provided in consultation with technical committee and approval of the competent authority.</p>

<b>Market Research Surveys (Para 4.19.4)</b>		
62.	The Directorate of Marketing and Inspection (DMI) should establish a Statistical Cell either independently or within Market Research and Planning Cell (MRPC) with sufficiently trained statistical personnel to undertake comprehensive analysis of survey data and aid the decision-making process.	DMI is already having a Statistical Section at the Head Office, Faridabad for looking after the major statistical work of quality control which has been transferred from Branch Head Office (BHO), Nagpur. This section needs strengthening with an ISS Officer and other supporting staff. However, the Market Research and Planning Cell (MRPC) operating from Branch Head Office (BHO), Nagpur has been diverted to Agricultural Universities/Institutes as per the recommendations of Expenditure Reform Commission. The BHO, Nagpur is now undertaking work of preparation of commodity profiles under the Scheme of Marketing Research and Information Network for which it has a small statistical set-up.
63.	The Statistical Cell of Directorate of Marketing and Inspection (DMI) should identify the problems and deficiencies in the market research surveys carried out by different institutions and develop a standard methodology for uniform adoption.	The Directorate, has got the exposure of problems and deficiencies in market research studies conducted by various institutions. The Statistical section at DMI, will identify the problems and deficiencies in market research surveys carried out by different institutions and develop a standard methodology for uniform adoption.
64.	A review of the item basket for the construction of Index Numbers of Area, Production and Yield should be undertaken immediately.	It is being done.
65.	The item basket for the construction of Index Numbers of Area, Production and Yield should be different for different States.	
66.	The present arrangements for the construction and release of Index of Terms of Trade should continue.	No further action required.

67.	The rates used to apportion the areas of constituent crops of major crop mixtures should be fixed for the recognised mixtures at sub-district and district levels and updated periodically.	The State Governments have been asked to take action in this regard.
68.	Data available from surveys conducted under schemes like Improvement of Crop Statistics (ICS) over the years should be used for deciding the crop mixtures and their ratios.	
69.	The Directorate of Economics and Statistics, Ministry of Agriculture (DESMOA) should collect, compile and maintain a complete database on State-wise production, sale of tractors, power tillers, harvesters and other agricultural implements, density of such implements per hectare, investment made, level of mechanisation, adoption of water saving devices, etc.	Such a database is being maintained by Deptt. of Animal Husbandry & Dairying based on results of their livestock census.
71.	The Directorate of Plant Protection Quarantine and Storage (PPQ&S) being the apex body for plant protection should act as a depository of information on plant protection. Efforts should be made to design, develop and maintain a comprehensive database on plant protection for effective long-term uses.	The Directorate of Plant Protection Quarantine and Storage (PPQ&S) has now provided statistics, publication report, human resource development etc on its website dacnet.nic.in/ppin.
72.	The Statistics and Computer Unit of the Directorate of Plant Protection, Quarantine and Storage (PPQ&S) should be strengthened both in terms of statistical and computer personnel as well as computer equipment.	At present there are posts of one Deputy Director (Statistics), one Astd. Plant Protection Officer, one Data Processing Astd. in computer and statistics unit. A provision has been kept for one system analysis cum programmer, one Sr. Stats. Astd., two data entry operators in 11 <sup>th</sup> Five Year Plan for proper functioning of this unit. Provision for six PCs with Printer, UPS, Scanner and CD Writer etc. has also been made.
73.	Information collected through General Crop Estimation Survey (GCES) and the scheme for Improvement of Crop Statistics (ICS) should be compiled to generate estimates on various inputs such as fertilisers, pesticides, multiple cropping, etc.	The State Govts. have been asked to take action in this regard.

## Demand Supply Projections in alternative scenarios by Sub Group C

### **Demand Projections**

#### **Three Approaches**

The demand projections for foodgrains, oilseeds and sugarcane, for domestic use, can be worked out by following three different approaches.

(a) One approach to project the demand for the future is by using projection of population and the baseline consumption parameters. The periodically conducted Nationwide Household Consumer Expenditure Surveys by National Sample Survey Organization (NSSO) provide detailed cross sectional estimates of per capita consumption separately for rural and urban areas for different commodities under foodgrains including rice, wheat, coarse cereals, pulses as well as oilseeds and sugar (including gur/khandsari) and the Mid-year projected population figures for 2001 up to 2026 being brought out by the Registrar General of India (RGI). The 55<sup>th</sup> Round (1999-2000), of NSSO, are the latest available comprehensive survey results, that are considered in the present exercise. This approach assumes short term static behaviour of consumption and is also followed by the Commission for Agricultural Costs and Prices (CACP) for its near time demand and supply assessment of foodgrains, in particular, in the context of their agricultural price policy formulation.

(b) The second approach to estimate the demand is the Normative Approach which is based on the normative requirement of foodgrains, oilseeds and sugar/jaggery as recommended by National Institute of Nutrition, Hyderabad, and the projected population figures brought out by RGI. The normative requirement for pulses has also been assessed as per standards set by ICMR (as reported in the NDC Sub-Committee Report on the subject). However, this is much higher than that of NIN, Hyderabad. For the purpose of this exercise, Sub-Group decided to adopt NIN's norms.

(c ) The third approach for assessing demand projections is the Behaviouristic Approach which is based on the growth of population and changing behaviour of consumption on account of changing per capita income in a growing economy and consumption/expenditure elasticity. The consumption for the base year has been assessed on the basis of availability for actual consumption i.e. production, net imports and change in stock.

The second and third approaches given above were used in the earlier Five Year Plans for assessing the demand.

As regards the assessment of demand for other commercial crops like cotton, jute & mesta, the above approaches are not applicable and accordingly compound annual growth rate in the last five years in domestic/industrial consumption has been used for

assessing the demand. As regards the demand for exports, the Sub-Group decided to use average of last three years for this purpose so as to take care of year to year fluctuations.

### **Seed, Feed & Wastage requirements**

In each approach, the requirement towards seed, feed & wastage is also added to arrive at the total requirement for the country as a whole. It may be mentioned here that the requirement towards seed, feed & wastage varies widely from crop to crop and State to State. As per the studies got done by IARI (ICAR), New Delhi, this requirement (including for industrial use) varies from 4.4% for rice, 9.4% for wheat, 25.6% for coarse grains, 19.8% for pulses to 10.3% for foodgrains as a whole for the year 2000. As per the studies conducted by Agro-Economic Research Centres, being funded by the Ministry of Agriculture, this requirement for wheat varies from 6.93% in Punjab, 19.30% in Madhya Pradesh to 12.03% in Uttar Pradesh; for paddy it varies from 6.88% in Andhra Pradesh, 15.53% in Bihar to 12.31% in Assam. With the increase in production and productivity, the seed requirement as a percentage of total output has been declining over the years. However, with the higher growth rate in output of animal husbandry sector, the requirement towards feed has been increasing over time. Therefore, for the present report, requirement for seed, feed and wastage was retained as 12.5% of the gross output as was done for the 10<sup>th</sup> Plan period for foodgrains except for rice for which this requirement has been taken as 7.6%.

For oilseeds, sugarcane and fibres this norm was not found applicable and different approaches were followed. For the oilseeds, a norm of 28% of gross output was used for oil recovery rate from oilseeds, seed, feed & wastage, consumption in secondary/supplementary sectors taken together as was done by the Working Group for 10<sup>th</sup> Plan on suggestion of Ministry of Consumer Affairs, Food and Public Distribution. As regards sugarcane, a norm of 11.67% was used for seed, feed & wastage (including chewing) based on information provided by Directorate of Sugar for the last six years ending 2002-03. For jute and mesta, seed, feed & wastage requirement has been taken as nil as suggested by the Jute Commissioner. However, for cotton a norm of 3% has been used only for wastage due to evaporation of moisture, micro dust, roller touch, gin jump etc as proposed by Cotton Corporation of India (CCI).

### **Demand Projections based on Household Consumption**

The NSSO had estimated monthly per capita consumption separately for rural and urban areas based on their household consumption expenditure survey conducted in 1999-2000 for different commodities under foodgrains including rice, wheat, coarse cereals, pulses as well as oilseeds and sugar (including gur/khandsari). On the other hand, the RGI has brought out the Mid-year Population estimates for the year 2001 and onward for each of the years up to 2026. These estimates, provided up to the end of the 11<sup>th</sup> Five Year Plan period, have been taken for this purpose. The per capita annual consumption of cereals (2001-02) is estimated at 144.9 kg as per the above survey and of pulses at 10.6 kg. The per capita annual consumption for oilseeds

and sugar & gur/khandsari as per the above survey is estimated at 24.8 kg (oils & oilseeds included) and 10.6 kg, respectively. The rate of recovery of sugar from sugarcane has been assumed to be 10.2% and of gur & khandsari to be 11.35% for working out sugarcane demand. The demand projections based on these assumptions and including seed, feed and wastage requirement have been worked out for all the five years of the 11<sup>th</sup> Plan period and are given in the following table:

(in million tonnes)

Year	Cereals	Pulses	Foodgrains	Oilseeds	Sugarcane
2007-08	182.83	13.84	196.68	27.62	132.69
2008-09	185.35	14.04	199.39	28.04	134.63
2009-10	187.84	14.24	202.08	28.45	136.55
2010-11	190.30	14.44	204.74	28.86	138.46
2011-12	192.73	14.64	207.37	29.27	140.35
Per Capita annual Consn as per NSSO Survey (Kg)	144.9*	10.6	155.5	24.8	10.6@

\* This includes 75.8 kg of rice, 54.8 kg of wheat and 14.3 kg of coarse cereals.

@Relates to sugar & gur/khandsari

### Demand Projections based on Normative Approach

The population growth and assumptions relating to total seed, feed & wastage have been made on the same lines as explained above. The normative requirement (as recommended by the National Institute of Nutrition (NIN), Hyderabad, has been taken for working out the demand) of 167.90 kg per consumption unit (CU) per year for cereals, 14.60 kg per CU per year for pulses, 7.30 kg per CU per year for edible oils and 12.78 kg per CU for sugar/jaggery. Here, oil recovery rate from oilseeds has been assumed to be 28% as was done by the Working Group constituted for 10<sup>th</sup> Five Year Plan (2002-07). The oil recovery rate however varies from 18% (soyabean), 28% (groundnut) to 33% (rapeseed/mustard) among major oilseeds. Therefore, any change in their relative share would affect oil availability. The CUs have been worked out by deflating the total population by a factor of 1.0605 as per the information provided by NIN, Hyderabad. The demand projections based on these assumptions have been worked out for each of the years of the 11<sup>th</sup> Plan period and are given in the following table:-

(In million tonnes)

Year	Cereals	Pulses	Foodgrains	Oilseeds	Sugarcane
2007-08	205.94	17.91	223.85	27.98	150.23
2008-09	208.86	18.16	227.02	28.38	152.36
2009-10	211.75	18.41	230.17	28.77	154.47
2010-11	214.62	18.66	233.28	29.16	156.57
2011-12	217.45	18.91	236.36	29.55	158.63

### **Demand based on Behaviouristic Approach**

Under this approach, the demand projections have been worked out based on the following assumptions.

- (a) The per capita income is estimated to have grown at the average rate of 4.8% per annum. The growth in per capita income has been adjusted by the rate of savings found to be around 22% for working out the per capita expenditure as per details provided by Central Statistical Organisation for the period 1999-2000 to 2005-06. This was the approach followed by the Working Group for 11<sup>th</sup> Five Year Plan.
- (b) Based on the results of certain studies, the expenditure elasticity has been assumed to be 0.15% for cereals, 0.62% for pulses, as was done by the Working Group for 10<sup>th</sup> Plan and 0.55% for oilseeds and 0.82% for sugar & gur/khandsari as worked out by Prof. P. Kumar for IARI (ICAR).

The annual domestic consumption of different commodities for the base year has been worked out on the basis of per capita availability derived from net production, net imports and change in stocks for the period 2002-03 to 2005-06. The three year moving average was worked out to remove the effects of fluctuations. On the basis of growth rate of moving averages, the consumption for the base year 2006-07 was estimated including the quantities required towards, seed, feed & wastage. Based on the rate of growth of income adjusted for savings and consumption elasticity, the demand requirements have been worked out for all the years of the 11<sup>th</sup> Plan period and are given in the following table:

(in million tonnes)

Year	Cereals	Pulses	Foodgrains	Oilseeds	Sugarcane
2007-08	196.94	16.66	213.60	45.30	254.47
2008-09	200.86	17.29	218.15	46.89	265.99
2009-10	204.78	17.94	222.72	48.52	277.95
2010-11	208.72	18.60	227.32	50.19	290.35
2011-12	212.66	19.28	231.94	51.89	303.21

However, as per the 11<sup>th</sup> Plan Approach Paper and subsequent discussion, it is envisaged that the GDP would grow at 9% per annum, resulting in per capita income growth rate of 7.4% per annum after adjusting for population growth of 1.5% per annum. With about 34% savings rate, the growth of per capita disposal income comes to about 4.8% per annum.

Accordingly, based on 4.8% per capita disposable income growth rate, the demand projections for all the years of 11<sup>th</sup> Plan have also been worked out and are given in the following table:-

(in million tonnes)

Year	Cereals	Pulses	Foodgrains	Oilseeds	Sugarcane
2007-08	197.25	16.77	214.02	45.56	261.75
2008-09	201.49	17.51	219.01	47.43	275.91
2009-10	205.75	18.29	224.04	49.35	290.74
2010-11	210.04	19.08	229.12	51.34	306.28
2011-12	214.35	19.91	234.26	53.39	322.54

### **Demand for terminal year of 11<sup>th</sup> Five Year Plan**

The comparative position of demand based on three approaches mentioned above for the year 2011-12, which is terminal year of the 11<sup>th</sup> Five Year Plan, for different crops, is as follows:-

(In million tonnes)

Crop (s)	Household Consn. Approach	Normative Approach	Behaviouristic Approach (1)	Behaviouristic Approach (2)	Range	Export (Ave. of 2003-04 to 2005-06)
Foodgrains	207.37	236.36	231.94	234.26	207-236	7.81
Oilseeds	29.27	29.55	51.89	53.39	29-53	3.12
Sugarcane	140.35	158.63	303.21	322.54	140-323	5.53@

@ converted from sugar taking recovery rate of 10.2%

(1) Based on 4.8% per capita income growth per annum adjusted for 22% savings

(2) Based on 4.8% per capita disposable income growth per annum

The demand projections given by the above mentioned three approaches differ significantly because of different set of assumptions used for their estimation. In the household consumption approach and behaviouristic approach, it would be desirable to add the requirement for 7.8 million tonnes of foodgrain exports also. In case of foodgrains, the buffer stock as on 1<sup>st</sup> July 2006 was about 7 million tonnes less than buffer norms which would require to be restored in subsequent years. Considering this food security requirement, one fourth of the existing buffer stock norm (about 2.3 million tonnes) is added to the demand for the terminal year of 11<sup>th</sup> Plan. However, under the normative approach, since the entire requirement will be met, there may not be any need to maintain buffer stock but export needs to be added. Keeping this in view, the foodgrains requirement under the three scenarios, namely, household approach, normative approach and behaviouristic approach ((1) & (2)), works out to 217 million tonnes, 244 million tonnes and 244 million tonnes respectively. The Sub-Group is of the view that for assessing the requirement, behaviouristic approach (2) would be appropriate.

Similarly, in the case of oilseeds and sugarcane also, it would be appropriate to accept the assessment based on the behaviouristic approach (2). Accordingly, by 2011-12, the oilseed requirement works out to 53 million tonnes and sugarcane requirement works out to about 340 million tonnes, after taking into account an average export of about 5.5 lakh tonnes of sugar per annum and 12 lakh tonnes (1/4 of the three months requirement) for buffer. However, if the present level of imports is maintained in the case of edible oils, the production of about 36 million tonnes would be required to meet the demand by the end of 11<sup>th</sup> Plan.

### **Demand projections by other agencies**

Demand projections for foodgrains have been made by other agencies also following varying assumptions and results of their studies are given below for comparison for a period nearby to terminal year of 11<sup>th</sup> Plan i.e. 2011-12.

(In million tonnes)

Agency	Year	Foodgrains Demand
Prof. Praduman Kumar for IARI (ICAR) (7% GDP Growth)	2010	247.8
Sh. Ramesh Chand for ICAR	2011-12	251.7
Ms. Surabhi Mittal(8% GDP Growth) for Planning Commission)	2011	210.8
Prof. N.S.S. Narayana for ISI, Bangalore	2011-12	235

In the case of foodgrains, considering various assessments made by experts/agencies and that of the Sub-Group, it would be appropriate to accept the assessment based on Behaviouristic approach (2) for the purpose of planning which is about 244 million tonnes for 2011-12.

## Demand Projections for Fibres

In case of cotton and jute/mesta, no household consumption details are available from NSS reports. The NIN, Hyderabad, has also not brought out any norms for their consumption. Further, there are no details available about consumption behaviour for these crops. Therefore, the demand projections for cotton have been worked out based on the compound annual growth rate worked out using details provided by Cotton Corporation of India (CCI) relating to mill consumption for the period 2000-01 to 2005-06. Similar details in respect of jute & mesta have been worked out using the details provided by the Jute Commissioner in respect of mill consumption and domestic/industrial consumption for the period 2000-01 to 2005-06. The demand projections so worked out for different years of the 11<sup>th</sup> Plan period are shown in the following table:-

( In million bales)

<b>Year</b>	<b>Cotton</b>	<b>Jute &amp; Mesta</b>
2007-08	24.16	9.83
2008-09	25.22	9.84
2009-10	26.33	9.85
2010-11	27.49	9.86
2011-12	28.70	9.87
<b>Exports (Average of 2003-04 to 2005-06)</b>	<b>0.29</b>	<b>0.08</b>

## Supply Projections

### The Approach

The Working Group constituted for the 10<sup>th</sup> Five Year Plan (2002-07) followed the following three methods for making supply projections of foodgrains (cereals and pulses). However, the Working Group, constituted for the 10<sup>th</sup> Five Year Plan for oilseeds/edible oils, had not made any supply projections. For the 11<sup>th</sup> Five Year Plan, these methods have been used for working out the supply projections not only for cereals, pulses & foodgrains but also for oilseeds, sugarcane, cotton, jute & mesta.

### Supply projections based on simple regression method

The supply projections through this method have been worked out based on simple linear regression\* on actual production for the last 11 years from 1995-96 to 2005-06 (except for pulses and sugarcane for which results are based on the period 1976-77 to 2005-06 due to fluctuating growth rate) and the results obtained are given below.

(in million tonnes)

Year	Cereals	Pulses	Food grains	Oil seeds	Sugar cane	Cotton **	Jute & Mesta #
2007-08	195.19	13.88	209.07	23.48	312.37	15.37	11.33
2008-09	196.52	13.96	210.48	23.66	317.66	15.76	11.43
2009-2010	197.84	14.04	211.88	23.84	322.95	16.14	11.52
2010-11	199.16	14.12	213.28	24.02	328.24	16.52	11.62
2011-12	200.48	14.20	214.68	24.20	333.54	16.91	11.72

# Million bales of 180 kg each    \*\* Million bales of 170 kg each

\*  $Y = a + bx$  where a, b are constants, x is time in years.

### Supply projections based on Exponential Growth Method.

Under this method, the supply projections have been worked out using log linear regression# over a period of 11 years (1995-96 to 2005-06), for all the five years of the 11<sup>th</sup> Five Year Plan, and the results are given below.

(in million tonnes)

Year	Cereals	Pulses	Food grains	Oil seeds	Sugar cane	Cotton *	Jute & Mesta@
2007-08	195.03	13.11**	208.14	22.80	278.39**	14.51	11.38
2008-09	196.42	13.11	209.53	22.92	278.39	14.84	11.49
2009-2010	197.82	13.11	210.93	23.05	278.39	15.19	11.61
2010-11	199.22	13.11	212.33	23.18	278.39	15.54	11.73
2011-12	200.64	13.11	213.75	23.30	278.39	15.90	11.84

#  $y = ab^t$  where a, b are constants and t is time in years.

\* Million Bales of 170 kg each    @ Million Bales of 180 kg each

\*\*Indicates no growth beyond 2005-06 level.

## Supply projections based on Multiple Regression Method

Under this method#, three variables namely percentage of irrigated area (barring jute & mesta where only two variables have been used), fertilizer consumption per hectare and area under production for each crop concerned have been used and actual production for last 11 (1995-96 to 2005-06) years has been used for forecasting the production for all the five years of the 11<sup>th</sup> Five Year Plan and the results are given below:

(in million tonnes)

Year	Cereals	Pulses	Foodgrains	Oilseeds	Sugarcane	Cotton @	Jute & Mesta*
2007-08	201.58	13.38	212.30	22.58	278.39**	16.08	11.40
2008-09	204.35	13.41	214.81	22.78	278.39	16.48	11.58
2009-2010	207.21	13.43	217.39	22.99	278.39	16.87	11.76
2010-11	210.16	13.46	220.03	23.21	278.39	17.26	11.95
2011-12	213.20	13.48	222.74	23.44	278.39	17.65	12.15

@ Million bales of 170 kg. Each      \* Million bales of 180 kg each.

#  $y = a + bx_1 + cx_2 + dx_3$  where a,b,c,d are constants.

\*\* Indicates no growth beyond 2005-06 level.

## Supply projections based on average annual growth rate method.

Under this method, the supply projections have been worked out using average annual growth rates of production for the period 2001-01 to 2005-06 for all the five years of 11<sup>th</sup> Five Year Plan and the results are given below:-

(In million tonnes)

Year	Cereals	Pulses	Foodgrains	Oilseeds	Sugarcane	Cotton @	Jute & Mesta*
2007-08	203.64	14.51	218.15	34.78	278.39**	26.84	10.90
2008-09	208.08	15.26	223.34	38.96	278.39	31.42	10.98
2009-2010	212.66	16.06	228.72	43.63	278.39	36.80	11.05
2010-11	217.39	16.89	234.29	48.87	278.39	43.09	11.13
2011-12	222.29	17.77	240.06	54.73	278.39	50.46	11.21

@ Million bales of 170 kg. Each      \* Million bales of 180 kg each.

\*\* Indicates no growth beyond 2005-06 level.

## Supply projections based on compound annual growth method

Under this method, the supply projections have been worked out using compound annual growth rates for a period of 5 years ending 2005-06, for all the five years of the 11<sup>th</sup> Five Year Plan and the results are given below.

(In million tonnes)

Year	Cereals	Pulses	Foodgrains	Oilseeds	Sugarcane	Cotton @	Jute & Mesta*
2007-08	199.20	14.03	213.23	32.64	278.39**	26.11	10.83
2008-09	201.26	14.51	215.77	35.42	278.39	30.15	10.86
2009-2010	203.36	15.01	218.37	38.43	278.39	34.83	10.90
2010-11	205.49	15.53	221.02	41.70	278.39	40.23	10.94
2011-12	207.66	16.06	223.72	45.24	278.39	46.46	10.98

@ Million bales of 170 kg. Each      \* Million bales of 180 kg each.

\*\* Indicates no growth beyond 2005-06 level.

## Supply for terminal year of the 11<sup>th</sup> Five Year Plan

The comparative position of supply for the year 2011-12 which is terminal year of the 11<sup>th</sup> Five Year Plan for different crops, based on three methods mentioned above, emerges as follows:-

(In million tonnes)

Crops	Simple Regression Method	Exponential Growth method	Multiple Regression Method	Average Annual Growth Rate method	Compound Annual Growth Rate Method	Range
Foodgrains	214.68	213.75	222.74	240.06	223.72	214-240
Oilseeds	24.20	23.30	23.44	54.73	45.24	23-55
Sugarcane	333.54	278.39	278.39	278.39	278.39	278-334
Cotton*	16.91	15.90	17.65	50.46	46.46	16-50
Jute & Mesta@	11.72	11.84	12.15	11.21	10.98	11-12

\* Million bales of 170 kg each.      @ Million bales of 180 kg each.

The supply projections given by above mentioned five methods differ widely due to procedural variations.

## Supply projections by other agencies

The supply projections for foodgrains have also been made by other agencies following different approaches and the results of their studies are given below for comparison for a period nearby to terminal year of 11<sup>th</sup> Plan i.e. 2011-12.

(In million tonnes)

Agency	Year	Foodgrains
Ms. Surabhi Mittal For Planning Commission	2011	225.8
Prof. N.S.S. Narayana For ISI, Bangalore	2012	241.00

The supply projections made by other agencies/experts for foodgrains vary between 226 to 241 million tonnes as against the assessment of 224 million tonnes made by the Sub-Group.

### Comparative picture of demand-supply projections for 2011-12.

The comparative position of demand projections based on Behaviouristic Approach (2) for 2011-12 for foodgrains, oilseeds, sugarcane and compound annual growth rate based last five years consumption for fibres are shown in the following table along with supply projections based on compound annual growth rates of last five years production in respect of foodgrains, oilseeds and fibres. As regards sugarcane, the supply projections have been based on Simple Regression Method (due to fluctuating growth rate in the past).

(In million tonnes)

Crops	Demand Projections for 2011-12	Supply Projections for 2011-12
Foodgrains	244@@	224
Oilseeds	53	45.**
Sugarcane	340#	334
Cotton*	29	46
Jute & Mesta@	10	11

\*Million bales of 170 kg each @Million bales of 180 kg each

@@ includes 25% buffer (2.3 million tonnes) and average export of 7.8 million tones

# includes 25% buffer (12 lakh tonnes) and average export of 5.4 lakh tonnes of sugar

\*\*The supply projections for oilseeds are based on realization of potential yield. This supply assessment would improve self sufficiency level in edible oils from existing 55% to 80%. However, if the level of edible oil imports to meet the domestic demand is assumed to be retained at present level (4.7 million tonnes), then the supply would require to be of 36 million tonnes of domestic productivity of oilseeds.

Considering the compound annual growth rate method, the supply is estimated to be about 224 million tonnes as against the requirement of 244 million tonnes including 10.1 million tonnes (7.8 + 2.3 i.e. 25% of the buffer) for exports and buffer. In the case of oilseeds, the supply based on compound annual growth is estimated to be 45.0 million tonnes as against the demand of 53 million tonnes based on the behaviouristic approach (2). Similarly, sugarcane requirement based on behaviouristic approach (2), is estimated to be 340 million tonnes which includes average export of 5.5 lakh tonnes of sugar and 12 lakh tonnes of buffer (25%). As against this, the supply of sugarcane in 2011-12 is estimated to be about 334 million tonnes as per Simple Regression Method. For cotton, as against demand of 28.70 million bales ( of 170 kg each), the supply will be 46.46 million bales as per compound Annual Growth Rate Method. For jute and mesta as against demand of 9.87 million bales (of 180 kg each), the supply is estimated to be 10.98 million bales as per compound annual growth rate method.

## Illustrative State wise growth monitoring

