
UNIT 13 PHASES IN AGRICULTURAL DEVELOPMENT

Structure

- 13.0 Objectives
- 13.1 Introduction
- 13.2 Overall Growth
- 13.3 Transformation of Traditional Agriculture into Modern Agriculture
 - 13.3.1 Phase I : Traditional Agriculture
 - 13.3.2 Phase II : Technologically Dynamic Agriculture With Low Capital Intensity
 - 13.3.3 Phase III : Technologically Dynamic Agriculture With High Capital Intensity
 - 13.3.4 Factors Essential for Modernisation
 - 13.3.5 Performance During the Modernisation Phase
- 13.4 Long-Term Problems of Agriculture
- 13.5 Let Us Sum Up
- 13.6 Key Words
- 13.7 Some Useful Books
- 13.8 Answers or Hints to Check Your Progress Exercises

13.0 OBJECTIVES

After studying this unit, you will be able to:

- 1 make an assessment of the importance of agricultural sector in the Indian economy;
- 1 identify the different phases of transformation of Indian agriculture from a traditional system to a modern system;
- 1 explain the different factors that brought about transformation;
- 1 establish the course of growth in agriculture through its different phases; and
- 1 highlight the different problems that the Indian agriculture is currently faced with.

13.1 INTRODUCTION

Agriculture has been the major source of livelihood in the Indian economy. Although, over the years, its contribution to GDP has come

down to 20.9 percent in 2004-05, the sector still supported an overwhelming 52.1 percent of workers in 2004-05. Notwithstanding major diversification in the structure of the economy over the last few decades, the dependence on agriculture thus still continues heavily. As agriculture remains a key sector in rural areas, it continues to have great potential for reducing poverty and hunger in the rural sector. For every additional rupee generated through agricultural production in India, the existing linkages can add three more rupees to the income of the rural economy. The pulls and pressures in the agricultural sector continue to exert their influence on the overall course of economic activity, although the relative dependence of the economy on the agricultural sector has registered a marked decline. Although double digit growth of the economy in some years may be feasible even with a very low contribution from agriculture, this cannot happen year after year without triggering an industry downturn.

During the era of economic planning (right from the first plan period to the eleventh) agricultural output has recorded a steady growth, along with growth in other sectors of the economy. The present unit provides a profile of growth in the agricultural sector distinguishing its different phases of growth, highlighting their features and identifying the factors underlying the growth in each of the phases.

13.2 OVERALL GROWTH

We begin by taking a look at the aggregate picture as it obtained beginning with the year 1951-52. For this purpose, we make use of the data presented in Table 13.1. It would be seen from Table 13.1 that:

1. Agriculture and allied activities sector maintained a steady growth of about 2.5 percent per annum during the period 1951-52 to 1980-81, when the total economy was growing at about 3.5 to 3.7 percent.
2. With acceleration in the rate of growth of GDP during the period 1981-82 to 1996-97, the growth rate in the agricultural sector also moved up to an average of 3.5 percent during 1981-82 to 1990-91 and 3.7 percent during 1991-92 to 1996-97.
3. Subsequently, while the total economy moved to a higher growth trajectory, clocking 6.6% during 1997-98 to 2004-05 and 9.5% during 2005-06 to 2006-07, growth rates in the agricultural sector initially dropped from 3.7 percent during 1991-92 to 1996-97 to 2.5 percent during 1997-98 to 2004-05 but accelerated to record 4.8% growth during 2005-06 to 2006-07.

Table 13.1 : Average Growth Rates of GDP, Agriculture and Non-Agriculture Sectors (percent)

(1999-2000 Prices)

Sl. No.	Phase/Period		GDP	Agriculture	Non-Agriculture
1.	Pre-Green Revolution	1951-52 to 1967-68	3.7	2.5	4.9
2.	Green Revolution Period	1968-69 to 1980-81	3.5	2.4	4.4
3.	Wider Technology Dissemination Period	1981-82 to 1990-91	5.4	3.5	6.4
4.	Early Reforms Period	1991-92 to 1996-97	5.7	3.7	6.6
5.	Ninth Plan	1997-98 to 2004-05	6.6	2.5	7.9
6.	Early years of Tenth Plan	2005-06 to 2006-07	9.5	4.8	10.7

It would be further seen from the data in Table 13.1 that:

- (i) Growth of agriculture over the entire period i.e. 1951-52 to 2006-07 remained lower than the growth in non-agricultural sector.
- (ii) The gap between the growth of agricultural and that of the non-agricultural sector began to widen since 1981-82, and more particularly since 1996-97, because of : (a) an acceleration in the growth of industry and service sectors, and (b) a deceleration in the growth of agriculture. This deceleration in the growth of agriculture is a cause for concern in view of the dependence of large proportion of workforce on the sector in the economy.

The growth in the agricultural sector, though lower than in the non-agricultural sector, remained higher than the growth of population. Between 1950-51 and 1990-91, production of food grains increased at an average annual rate of 2.5 percent compared to the growth of population which averaged 2.1 percent during this period. As a result, India almost became self-sufficient in food grains and there were hardly any imports during 1976-77 to 1990-91, except occasionally. The rate of growth of food grains production, however, decelerated to 1.2 percent during 1990-2007, lower than annual average rate of growth of population of 1.9 percent. The per capita availability of cereals and pulses, therefore, witnessed a decline during this period.

How did the initial transformation come about? Why did the rate of growth slow down? What were the determinants of growth in each of the phases? We analyse these factors in the subsequent sections below. Before that, you may attempt the following questions to know your grasp of what we have outlined so far.

Check Your Progress 1

1. Why is agriculture important to the Indian economy?

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2. In terms of the relative position of growth in the agricultural sector, with that in the non-agricultural sector, presented in Table 13.1, identify two periods in which the growth in the latter was more than that in the growth of the former.

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3. What was the major consequence of slow-down in growth of output in the agricultural sector?

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13.3 TRANSFORMATION OF TRADITIONAL AGRICULTURE INTO MODERN AGRICULTURE

A study of the economic framework within which traditionally low productivity agriculture is transformed into high productivity modern agriculture is important in policy-formulation and planning for growth. Productivity here refers to productivity of available land, labour and capital resources; and this involves larger use of the more abundant labour resources and a smaller use of scarce resources like capital, foreign exchange and expert personnel. An absolute criterion cannot be laid down about the content and chronological order of such compositions, since agriculture varies vastly from area to area in terms of **physical conditions** (i.e. soil moisture, cropping pattern, responses, availability of labour, etc.), **cultural factors** (education, receptivity to innovations, consumption pattern, etc.), **economic factors** (prices of inputs and outputs) and **institutional factors** (nature of research, extension, marketing supply and other institutions). Nevertheless, in the context of Indian agriculture, three distinct phases of growth can be distinguished as follows.

Phase II : Technologically dynamic agriculture, with low capital intensity

Phase III : Technologically dynamic agriculture, with high capital intensity

13.3.1 Phase I: Traditional Agriculture

This is a technologically stagnant phase in which a larger farm production becomes generally possible only through increased application of all three traditional inputs viz. land, labour and capital. The rate of increase of output is normally smaller than the rate of increase in inputs - revealing diminishing productivity of inputs, even at a low yield. Even if some elements of dynamic agriculture like application of fertiliser, improved seeds, and land reform are introduced, the increase in productivity is smaller. Further, given their resources and knowledge, the traditional farmers cannot become any more efficient as both these factors strongly limit their participating actively in contributing to higher production.

Till mid 1960s, the Indian agriculture was typically embodied within the framework of traditional agriculture outlined above. The period 1950-51 to 1966-67 can be easily divided into two sub-periods as follows:

1. **First sub-period (1951-61) :** This period lasted over the first decade of economic planning spread over the period covered by the first and second Five Year Plans. The primary characteristic of this period was that production of agricultural crops consistently maintained an upward trend, except for small dips in two years, 1957-58 and 1959-60. The index number of production of all crops went up from 45.6 in 1950-51 to 66.8 in 1960-61 (Base: 1981-82=100).
2. **Second sub-period (1961-67):** During this period [i.e. 1960-61 to 1966-67] production either declined or remained stagnant in the case of a number of major crops, especially food grains, as can be seen from Table 13.2 below:

Table 13.2: Production of Food Grains in India
(Million Tonnes)

Year	Output
1961	60.9
1962	61.8
1963	60.2
1964	61.8
1965	67.3
1966	54.6

This led to a serious crisis in the Indian economy prompting a re-appraisal of the growth strategy pursued in the agricultural sector. This reappraisal of policies and strategies brought about a transformation in Indian agriculture, leading to what can be marked as phase II of Indian agriculture.

13.3.2 Phase II: Technologically Dynamic Agriculture With Low Capital Intensity

The Indian agriculture entered the next phase after mid 1960s. This is described as phase II marked for technologically dynamic agriculture with low capital intensity. This is the beginning of the process of transformation from traditional agriculture to modernisation.

In this phase, agriculture still represents a large portion of the total economy. But population and incomes would be rising, increasing the demand for agricultural products while the size of the average holding would be coming down. There is scarcity of capital both for industry and agriculture. The farm sector tends to use more labour than capital, since labour, owned or hired, would be still, relatively cheaper than mechanisation.

The distinguishing feature of phase II is the application of science and technology, evolved by research institutions, in a progressively large measure. This increases the productivity of farms when small capital additions are made in the form of improved seeds, fertilisers and pesticides. The profitable innovations are accepted by the farmers despite imperfections in land tenure, marketing and input supply system.

Indian agriculture entered this phase of transformation after the mid-1960s. The stagnancy that had marked the agricultural sector during the early 1960s, had largely been overcome around the end of the decade. In the wake of the new agricultural strategy of growth (called the Borlaug seed-fertiliser-technology) that had been adopted, agricultural production especially food grains, began to increase sharply (Table 13.3).

Table 13.3: PRODUCTION OF MAJOR CROPS

(Million Tones)

Crop	1960-61	1970-71	1980-81	1990-91
Food grains	82.0	108.4	129.6	176.4
Oil seeds	7.0	9.6	9.4	18.6
Sugarcane	110.0	126.4	154.2	241.0
Cotton	5.6	4.8	7.0	9.8
Jute	5.3	6.2	6.5	7.9

This fact is brought out more clearly by the index numbers of agricultural production presented in Table 13.4.

Table 13.4: Index Numbers of Agricultural Production

(Base : 1981-82 = 100)

Year	Index No.
1960-61	66.8
1970-71	85.9
1980-81	104.1
1990-91	148.4

Increase in agricultural production can be attributed either (i) to increase in area under cultivation (i.e. horizontal expansion) or (ii) to an improvement in yield per hectare (i.e. vertical expansion) or (iii) to both an increase in area under cultivation and an improvement in yield per hectare. During this phase of transformation, significant contribution to improved agricultural output was achieved by way of improvement in agricultural productivity with little change in area under cultivation. Index number of area under cultivation changed marginally from 96.3 in 1970-71 to 105.2 in 1990-91. On the other hand, the index number of agricultural production increased from 85.9 in 1970-71 to 148.4 in 1990-91 (Base: 1981-82 = 100).

This phase of agriculture transformation came to be known as the period of **Green Revolution**. The green revolution was, however, confined to a few crops- wheat and rice, and to few regions. The shortcomings of this revolution are discussed separately in the next unit (unit 14: section 14.4).

13.3.3 Phase III: Technologically Dynamic Agriculture With High Capital Intensity

As phase II advances, more and more innovations giving small returns singly, but large returns jointly, would be accepted leading to higher productivity. In order to expedite progress, there should be an extensive utilisation of available abundant factors. At the same time, relatively scarce infrastructural facilities like research, extension, marketing, etc. should be utilised optimally with efforts directed towards expanding the infrastructural resources.

Indian agriculture entered the third phase of technologically dynamic agriculture with high capital intensity towards the end of the decade of 1980s. This was precisely the period when the non-agricultural sectors also began their march towards modernisation. Non-agricultural sectors were facilitated in their move towards aggressive modernisation by the new policies of liberalisation, privatisation and globalisation. You will be studying more about this in units 21 and 23 separately.

This phase of agricultural transformation is thus characterised by the substitution of labour by capital by way of large-scale farm machinery, and considerable competition between the sectors for capital.

Before we review the performance of the agricultural sector in this phase of modernisation we first identify the factors that brought about this transformation to modernisation.

13.3.4 Factors Essential for Modernisation

The various factors that can be identified as essential for modernisation of agriculture can be classified into following five groups.

I. Physical Input Factors

- (1) Non-human physical inputs: (a) land, (b) climate, (c) seeds, (d) water, (e) fertilisers, (f) pesticides, (g) institutional arrangements, (h) work animals, (i) other animals, (j) tools and machinery, (k) fuel and power other than animal power.
- (2) Human resources: Manual labour and skilled labour

II. Economic Factors

- (1) Transport, storage, processing, and marketing facilities.
- (2) Facilities for the supply and distribution of inputs, including credit.
- (3) Input Prices including interest rates.
- (4) Product prices including prices of consumer goods.
- (5) Taxes, subsidies and quotas.

III. Organisational Factors

- (1) Land tenure
- (2) Farm size
- (3) General government services and policies
- (4) Voluntary and statutory farmers' organisation for:
 - (a) Co-ordinating physical input use like irrigation, tractors, etc.;
 - (b) Economic services like purchase, sale, credit, etc.;
 - (c) Social services like education and health;
 - (d) Diffusion of knowledge like adult education, youth clubs etc. and;
 - (e) Local government.

IV. Cultural and Motivational Factors

- (1) Integration of agricultural institutions (like practices and values) within the culture and social system of the nation;

- (2) Public administration factors like structure and mode of operation of the bureaucracy;
- (3) Social structure like cultural values and dynamics of peasant communities;
- (4) Processes of socio-cultural changes like barriers and motivations in the innovative practices, functional harmony, etc.

V. Knowledge Factors

- (1) Organisations of research
- (2) Diffusion of knowledge relating to
 - (a) technical knowledge like agronomy, plant genetics, soil science, water management, agricultural engineering, pest control, etc.;
 - (b) economic knowledge like land economics, general economics, farm management;
 - (c) knowledge of policies in planning and public administration;
 - (d) general educational initiatives like literacy promotion, adult education, mass communication, etc.

It would be observed from the above classification that modernisation of agriculture results from a whole galaxy of factors, that include economic, organisational, cultural, motivational and knowledge factors. While all these factors cannot be provided in one go, they trickle in slowly over a long time before they get established and stabilised.

There is thus no single point of time which can be identified as the point of transformation. Emergence of these factors is the culmination of efforts initiated both by the state and the market forces.

Check Your Progress 2

1. Broadly, outline the three phases of agricultural transformation in India.

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- 2 Outline the performance of agriculture during the traditional phase in India in about 50 words.

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3. Outline the salient features of Indian agriculture during the phase of early modernisation in about 50 words.

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4. Mention in brief the different factors essential for modernisation of agriculture.

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13.3.5 Performance During the Modernisation Phase

The phase of modernisation of agriculture, in terms of performance, can be divided into two sub-periods: (i) 1985-86 to 2000-01, and (ii) 2001-02 onwards.

(i) Sub-period 1985-86 to 2000-01: This phase of modernisation witnessed a jump in agricultural production. The index number of agricultural production jumped up to 165.7 in 2000-01 from 104.1 in 1980-81. There was not much change in area under cultivation; the index number of area under cultivation moved up from 99.7 in 1980-81 to a mere 102.7 in 2000-01. It thus follows that the improvement in agricultural output could be attributed solely to increases in yield per hectare. The index number of yield per hectare moved up from 102.9 in 1980-01 to 144.3 in 2000-01.

This phase of modernisation was different from the earlier phases because the sources of agricultural growth and growth processes were considerably different which may be identified as follows:

One, from a food grain led growth of the earlier period, to horticultural products, livestock products and fishery.

Two, food grain growth in the past was largely driven by technology, incentives by the government in terms of support/procurement prices and heavy investments in public sector as in canal irrigation and power supplies. But in this phase the growth was *demand and market driven*.

Three, incentives in terms of trade, and private sector investments in minor irrigation and agricultural machinery have acted as *new drivers of growth*.

(ii) **Sub-period 2001-02 onwards:** Despite favourable terms of trade for agriculture and normal south-west monsoon, growth of agricultural production has been sluggish during this phase. It fluctuated wildly as would be seen from Table 13.5 below.

Table 13.5: Index Numbers of Agricultural Production

Year	Index No.
2001-02	178.8
2002-03	150.4
2003-04	183.0
2004-05	177.3
2005-06	191.6
2006-07	197.1

The sluggishness and volatility in growth may not have big impact on overall growth of the economy. But as the agriculture sector supports more than half of the population, it implies rising skewness of income.

Factors Responsible for Sluggishness

The sluggishness and volatility in agricultural output in the post 2001 years can be attributed to the following factors:

1. Decline in public investment in agriculture, which slowed the expansion of irrigation.
2. Low public investment in R&D (0.5 percent of agricultural GDP as against the norm of 1 percent recommended by the ICAR), affecting technological progress.
3. Decline in the annual growth rate of area under high yielding variety (HYV) crops;
4. Fall in soil fertility due to intensive cultivation and wheat-rice rotation year after year in the north-western region.
5. Over-exploitation of groundwater due to unregulated expansion of tube-wells.

All these factors make it imperative that closer attention is paid to the long-term problems.

Check Your Progress 3

1. How was the growth in agriculture during the early phase of modernisation different from its earlier phase (i.e. traditional agriculture).

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2. Make an assessment of agricultural growth during the recent phase of modernisation i.e. during post-2001 years in about 50 words.

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3. Account for the sluggish growth in agriculture in recent (i.e. post-2001) years in about 50 words.

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13.4 LONG-TERM PROBLEMS OF AGRICULTURE

The current phase of modernisation has thrown up some challenges which cannot be ignored any more. Unless these are squarely faced and comprehensive solutions worked out, the growth of the economy may be up against insurmountable barriers. The more important of these challenges are as follows:

1. **Problems Relating to Rain-fed Crops:** In respect of rain-fed crops such as coarse grains - poor man's food - specially pulses, constraints on raising production are well-known. These are:
 - i) An effective set of fully-developed technologies and extension methodology requires to be devised.
 - ii) High degree of uncertainty together with the relative poverty of the farmers make the application of even known improved practices difficult and risky.
 - iii) The rural poor, particularly in the drought-prone areas and in remote areas of the country, continue to suffer from fluctuations in employment and income and inadequate availability of food grains in years of drought.
2. **Problems Relating to the Use of Farm Inputs:** No less crucial to sustaining high growth rates in agriculture is the role played by farm inputs. Problems in this respect are the following:

- (i) In regard to irrigation, though the area has shown a good improvement, the flow of benefit has not been commensurate. This is reflected both in the low intensity of cropping and in the under utilisation of the potential created. The efficiency in the use of irrigation facilities also leaves much to be desired. In view of this, the productivity of irrigated land in the country is less than 50 percent of the potential.
- (ii) We have not been able to reach the targeted levels in the consumption of fertilisers. Even more important than the quantity consumed is the efficiency in the use of fertilisers. This has not been the case in the recent past, although there is a growing awareness of the problem. Besides this, the pattern of fertiliser consumption in the country is very highly skewed. In certain regions, a few crops and the rabi season account for the bulk of the fertiliser use.

Recent plans have stressed the need for equitable and efficient distribution system, reduction in regional disparities and correction of the crop-wise imbalance that now exists in regard to various inputs.

3. Problems of Small Farmers: Over 80 million of 90 million operational farm holdings in the country are below 2 hectares in size. About 60-70 percent of GDP from agriculture comes from subsistence agriculture. Unless small farmers are helped to improve their productivity and profitability through optimum use of their land, water, credit and other resources, it will not be possible to achieve our goal in food production for a population of billion-plus.

4. Decline in Productivity of Input: A major concern has been the decline in the productivity of modern inputs. Various explanations have been given for declining productivity of inputs. These are:

- i) The new technology was initially adopted in areas with assured irrigation. The extension of new technology into more difficult terrains is bound to be more costly and capital intensive.
- ii) Of late, there is evidence to suggest that new agricultural technologies are also spreading in the rain-fed areas. The investment cost are substantially higher in the case of rain-fed areas than in the areas with assured irrigation.
- iii) The fall in productivity could also have taken place because of the inefficiency in the use of inputs.

5. Rising Cost of Production in Agriculture: Over the last two decades, the prices received by the farmers have lagged behind the input prices, especially with regard to the prices of industrial inputs. The prices of important agricultural crops are reviewed every year by the government to keep them in line with costs of production and input prices. But often, what the farmers receive in effect is a weighted sum of the prices offered by the government and those prevailing in the free market. In

this situation, the deteriorating terms of trade for farmers would mean either the inability of the government to compensate them adequately for the increases in cost of production and/or inadequate impact of the government measures on the free market prices.

6. Weakening of Linkages Between Agriculture and Industry:

Although the inter-dependence of the agricultural and the industrial sectors has increased over the years, the strength of linkage between the agricultural and the manufacturing sectors has weakened. It must be realised that with the majority of the population still depending on agriculture, and with a high rural bias in the culture of population, weakening of this linkage is a serious matter of concern. One should recognise that it is not just the neglect of the agricultural sector, but also the declining strength of the linkages between the agriculture and the industry that could be quite disastrous for the development process.

7. Highly Regulated Sector:

Equally critical is the fact that agriculture is highly regulated that imposes restrictions on movement of agricultural products. Among these, the more important can be identified as: (i) compulsory levies (e.g. sugarcane, cotton); (ii) licensing requirements (e.g. exports of agricultural products), and (iii) internal trade restrictions (i.e. inter-state restrictions).

To sum up, although during the last six decades impressive gains have been made in agricultural production in some parts of the country, much still remains to be done to establish a balanced progress.

Check Your Progress 4

1. State in brief the problems relating to rain-fed crops in India.

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2. Make a brief assessment of use of inputs in farm sector in India.

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3. Account for the declining productivity of inputs in Indian agriculture.

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13.5 LET US SUM UP

Agriculture is the major source of livelihood in the Indian economy, notwithstanding a significant diversification and structural change that has been witnessed over the last six decades. Along with other sectors of the economy, the agricultural sector has been undergoing remarkable transformation. We have slowly and gradually, moved from a system of traditional agriculture of the 1950s to the modern technologically dynamic high capital intensive agriculture, in which along with food and non-food crops, horticulture and other allied activities have also expanded. However, rapid transformation of agriculture is faced with the challenge of meeting the food and non-food needs of a billion plus population. The challenge is daunting calling for out-of-box solutions to different problems which the sector is currently facing. In the past i.e. mid 1960s and afterward, we found a viable solution in HYV-fertiliser-water technology which ushered in Green Revolution. We have to, however, move beyond the Green Revolution now. The subsequent unit 14 deals with this theme.

13.6 KEY WORDS

Productivity	: Refers to output per hectare of land.
Traditional Agriculture	: A system of agriculture in which primitive inputs and techniques of production are used; it is more dependent on natural factors.
Modern Agriculture	: A system of agriculture in which scientifically-developed inputs and advanced techniques of production are used.
Borlaug Seed Fertiliser Technology	: Refers to the technology that banked heavily on seed and fertiliser mixed application. So named after its discoverer Norman Borlaug.
Intensity of Cropping	: $\frac{\text{Gross Cropped Area}}{\text{Net Sown Area}} \times 100$
Diversification of Agriculture	: It implies a use of resources in a larger mix of diverse and complementary activities within agriculture.
Support Price	: Minimum guaranteed price at which the government is to purchase any quantity offered to it for sale.
Procurement	: Refers to purchase of crop by the government.

13.7 SOME USEFUL BOOKS

1. Dhingra, Ishwar C. (2008), The Indian Economy, Environment and Policy, Twenty-Third Edition, Sultan Chand, New Delhi.
2. Government of India, Economic Survey (Annual).
3. Hanumanta, Rao (2005), Agriculture, Food Security, Poverty and Unemployment, OUP, New Delhi.
4. Bhalla, G.S. (2007), Indian Agriculture Since Independence, National Book Trust, New Delhi.
5. Basu, Kaushik (ed.), (2007), The Oxford Companion to Economics in India, OUP, New Delhi.

13.8 ANSWERS OR HINTS TO CHECK YOUR PROGRESS EXERCISES

Check Your Progress 1

1. See Section 13.1
2. See Section 13.2
3. See Section 13.2

Check Your Progress 2

1. See Section 13.3
2. See Section 13.3.1
3. See Section 13.3.2
4. See Section 13.3.4

Check Your Progress 3

1. See Section 13.3.5
2. See Section 13.3.5
3. See Section 13.3.5

Check Your Progress 4

1. See Section 13.4
2. See Section 13.4
3. See Section 13.4