

**"AGRICULTURAL DEVELOPMENTS  
MAHARASHTRA DURING THE REFORM  
PERIOD - 1991-2011"**

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**PRINCIPAL INVESTIGATOR**

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## **DECLARATION**

I hereby declare that the dissertation entitled "**Agricultural Development of Maharashtra During The Reform Period - 1991-2011**" completed and written by me has not previously formed the basis for the award of any Degree or Diploma or other similar title of this or any other University or examining body.

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# **CHAPTER - I**

## **METHODOLOGY AND DATABASE**

### **1.1 AGRICULTURAL ECONOMY OF MAHARASHTRA**

The agriculture, as elsewhere in India is an important economic activity in which nearly 62 per cent of working population is engaged. Moreover, of the total state domestic products (SDP), agriculture sector contributes nearly 17 per cent in Maharashtra. It was observed that, during the last forty four years that, the relative share of agriculture to-the state economy has been continuously declining. Thus, it reflects the fact that other sectors i.e. industry and tertiary sectors are becoming leading sectors in contributing to state's GDP. On the contrary agricultural sector in the state though making progress, it's performance did not show much satisfactory. It is due to the fact that land productivity did not improve much. Moreover, the soil and climatic conditions in the state are such that it has both inferior cropping and relatively low yield in respect of most of the important crops. Major part of its tertiary sector fall on the plateau where the rainfall is low and highly unstable for the vast tracts. Moreover, the productive capacity of the soil has progressively deteriorated as a result of unchecked erosions.

Land use statistics showed that, of the total geographical area (301.58 lakh hectares), nearly 178.76 lakh hectares which accounts for 58 per cent of the total area was used for raising agricultural crops. Moreover, there is no further scope to bring additional land for increasing agricultural production in the state. In this situation, expansion of multiple cropped area is the only solid and enduring way to increase agricultural production. In this regard, agriculture in the state did not achieve progress; because, the level of cropping intensity is about 121 indicating the fact that only 21 per cent cultivated land is being used for multiple crops, which in turn depends on the irrigation facilities. Out of the total cultivated area, nearly 15 per cent area in agriculture is brought under irrigation. Therefore, the success and failure of

agriculture in the state is carried out: under dry conditions. Moreover, climatic conditions in the state are such that, they contribute both an inferior cropping pattern and relative low yield of the crops. Cropping pattern in the state, in fact, is dominated by Jowar, Bajara and low valued crops. Moreover, due to low irrigation facilities, the application .of new agricultural technology remained restricted. In fact, the state has not been able to participate in the green revaluation at substantial level that occurred in some other states since mid sixties. Still majority of cultivators do not have much scientific knowledge of what, how much and how to use modem agricultural inputs especially in scanty rainfall areas. Thus, the .lagging in the use of such improved technology resulted in stagnant agricultural productivity. As against this background of agriculture, therefore, it is essential to study the growth of prospect of such agriculture more intensively and find out of the inforces for future development agenda alongwith remedial measures. With this attention in mind the topic has been selected for review and observations.

## **1.2 STATEMENT OF THE PROBLEM**

The present study tries to explain, the impact of new Economic Policy (NEP) introduced in 1991. The main components of new policy are liberalization, privatization and globalization. New economic policies long way impact on the Indian agricultural development as well as Maharashtra's agricultural development. For example, change in cropping pattern, new trends in agricultural technologies, change in import - export, some changed in agricultural policies and programmes for strategies etc. and also examine the present performance of agricultural development of Maharashtra state with a view to identify certain lapses, which could be removed through a suitable strategy of sustainable agricultural development in the state for the global competency.

### **1.3 OBJECTIVES OF THE STUDY**

Keeping in view the importance of the agriculture in Maharashtra, following objectives were set to examined.

1. To examine the growth performance of agriculture during the economic reform period 1991-2011.
2. To examine changes in cropping pattern and land use patterns.
3. To study the use of modern inputs in agriculture and their impact on agricultural production.
4. To study the trends in agricultural exports.
5. To study the state government policies relating to agriculture.
6. To examine the emerging problems of agriculture in the state.

### **1.4 RESEARCH METHODOLOGY**

This study mainly based upon secondary data. In view to examine the objective of the study, secondary data on land use pattern, cropping pattern, production of different crops being produced in the state, modern agriculture inputs etc. were collected from the reports, documents published by Government of Maharashtra from time to time. Moreover, in view to examine the growth prospects of agriculture, the reforms period 1990-91 to 2010-11 has been selected.

#### **1.4.1 Selection of Indicators**

This study has included different indicators for analyzing the levels of development also indicators have been selected from both sectors-input and output. On output side, present agricultural productivity measured in terms of standard nutritional units, value of crops per unit of net cropped area and production of foodgrains per hectares, has been taken into account. On input side only five indicators have been selected. They are

1. Net irrigated area as percentage of gross cropped area.
2. Percentage of cereal's area under high yielding variety of seeds.

3. Use of fertilizer Kg/ha of cropped area, density per thousand hectares of cropped area.
4. Use of machinery and implements.
5. Growth and production of principal crops.
6. Trends in agricultural exports.

Value of these indicators have been utilized by two methods as follows -

- 1) Ranking co-efficient Method.

$$T = \frac{S}{\frac{1}{2}n(n-1)}$$

- 2) Composite Index of Development

$$CDI = \left( \frac{p'}{p} \times 100 \right) + \left( \frac{C_1}{C} \times 100 \right)$$

#### **1.4.2 Methods and Techniques of Data Analysis**

The present study is based on secondary source of data. This involved collection of all available data which would indicate development, changes and trends in the agriculture of Maharashtra state. These data was scattered in published and unpublished records of different Departments of the Government of Maharashtra state. These data was then transformed into rates, ratios and percentages. Analyses have been taken with both absolute and percentage values. The methods applied include, use of correlation, percentage, mean, compound growth rate, combination and grouping techniques. The essential matter so derived is presented in maps, diagrams, graphs and tables, synthesizing a large body of data into present study.

#### **1.4.3 Sources of Data**

A variety of sources of data have been tapped for the preparation of the present dissertation. Most important source of agricultural statistics is the office of Commissioner of Land Records and Settlements, Maharashtra state. Several publications are brought out by this office, such as Season and Crop

Reports, Basic Agricultural Statistics of Maharashtra, Agricultural Census of Maharashtra state. Economic Survey of Maharashtra etc. These publications have certain statistical information about area, production and irrigation, land use, agricultural implements, fertilizer and HYVP seeds etc. Directorate of Agriculture, Maharashtra state, Mumbai also publishes agricultural data. Among them annual publication of agricultural statistics contains valuable information about the area production and yield crops, irrigation, use of fertilizer and inputs and other developmental measures. Publications of the Directorate of Economics and Statistics, Mumbai, Maharashtra state has provided many useful data through its publications, particular mention be made of statistical Handbook of Maharashtra 1990-91 to 2003-04, Quarterly Bulletin of Economics and Statistics, Government of Maharashtra. These have been the main sources of data for the past reforms years.

## **1.5 PLAN OF WORK**

The study has been divided into six chapters. Chapter 1<sup>st</sup> deals with methodology and data base. This covers, agricultural economy of Maharashtra, statement of the problem, objective of the study, research methodology and plan of work. Chapter 2<sup>nd</sup> deals with the cropping pattern and changes therein during the economic reform period. In which, concentration and diversification of crops have been tried to be assessed, which culminates information of crop zones of different rank order and in determination of crop combination regions. Changes in area, and extent of major crops have been discussed. It also includes discussion on land use, crop strature, use of high yielding varieties of seeds and use of fertilizers in relation to the size of operational holdings. Chapter 3<sup>rd</sup> deals with the changes in Land use pattern during the period under study. Spatial pattern of uses of modern yield, raising technologies have been analyzed in Chapter 4<sup>th</sup>.

Agricultural growth during the economic reforms is the subject matter of Chapter 5<sup>th</sup>. It starts with the discussion on changes in production of major crops. It has been tried to see whether these changed in production are due to

the changes in area or yield or due to both. In the last section of the chapter relationship between agricultural growth and economic reform have been discussed. Chapter 6<sup>th</sup> deals with the agricultural exports, which tries to explain the emerging trends and their present performance of agricultural export .during the period from 1991 to 2011. Chapter 6<sup>th</sup> deals with summary, findings and policy guidelines.

## **CHAPTER - II**

### **CHANGE IN CROPPING PATTERN**

#### **2.1 INTRODUCTION**

Cropping pattern means the proportion of area under different crops at a particular period of time. A change in cropping pattern mean a change in the proportion of cultivated land under different crops during the period under review. The cropping pattern is governed by many factors e.g. -

1. The general agronomical conditions, particularly the soil, climate, water supply and sub-soil water table etc.
2. Aim of agricultural production, size of holdings, techniques of agriculture and change in market prices etc.

#### **2.2 SIGNIFICANCE OF CROPPING PATTERN**

Cropping pattern is of a greater importance for the following reasons :-

1. The cropping pattern indicates, how the available land is distributed for the production of different crops,
2. The productivity and production of land also depends upon the type of cropping pattern.
3. The cropping pattern reflects the fact as to whether farming is subsistence or commercial.
4. The cropping pattern represents the topography, quality and quantity of land.
5. The cropping pattern determines the economic conditions of the farmers.
6. The cropping pattern reveals, the use of available land.
7. The cropping pattern represents the progress of agriculture and position of agriculture in countries/region economy.

## **2.3 FACTOR INFLUENCING THE CROPPING PATTERN**

Cropping pattern in agriculture is governed by the farmer's cropping choices in individual farms. It is mainly influenced by following importance factors.

### **2.3.1 Physical Factors**

The natural conditions of a country / region are the most important factors in determining the cropping pattern. It consists of soil, climate, rainfall, surface, features of land etc. Certain kinds of soil and climate are suitable for particular crops for example, the soil and climatic conditions in Gujarat are suitable for production of tobacco. In the areas of scanty rainfall, Jowar and Bajara are grown.

### **2.3.2 Social and Personal Factors**

Social factors such as density of population, customs, traditions, attitudes towards material things, willingness and capacity for change etc. have an important bearing on the types of crops grown and the area devoted to different crops. Change in social attitude, a new knowledge and new facilities, publicity of a new technical and new seeds lead to change in cropping pattern.

Each factor is related to cultivation of a particular crop and hence influence the cropping pattern. It include requirements of family consumption, meeting cash requirements, fodder needs, seed requirements, maintaining soil fertility and properties by concerned agencies etc.

### **2.3.3 Economic Factors**

Economic factors consist of prices, income,, size of land holding, availability of agricultural resources land tenure system etc. The farmers will prefer the crops which will ensure him a large amount of income. So they decide the crop to be grown on a large scale and small scale. Availability of agricultural inputs like water supply, fertilizers, seeds, also influence cropping

pattern. Further land tenure systems, rent pattern too have their influence on the cropping pattern.

#### **2.3.4 Government Policy**

Government policy have much bearing on pattern of the country's policies relating to profiles given to various crops, exports, taxes, supply of credits, crop and area under it.

#### **2.3.5 Technological Factors**

Technological factors also influence the cropping pattern. A new technology brings about change in the cropping pattern for example, irrigation facilities, mechanization, introduction of new methods of cultivation and harvesting etc. have considerable influence on cropping pattern.

### **2.4 CHANGE IN CROPPING PATTERN**

Agriculture in Maharashtra is mostly of the intensive in nature with an emphasis on the production of foodgrains. Some crops like Cotton, Sugarcane, Oilseeds, Vegetables and Fruits etc. are grown for the market validating their classification as commercial crops. In parts of the Western Ghats, shifting cultivation in a degenerated farm is practised.

There are two main crop growing seasons, Kharif and Rabbi. The kharif crops are sown with the onset of monsoon and harvested is September-October. The rabi crops are sown in October-November and harvested in February-March. There are some crops like Jowar and Cotton, which are grown in both the seasons. Also, Sugarcane stands in the field for 12 to 14 months spread over both the seasons.

Over a large areas in Maharashtra are found rain fed crops. This is known as "Jirayat" or unirrigated land. Here, the farmer is entirely dependent on the nature for crop production. Most of the farmers have successfully adopted dry farming techniques, where conservation of moisture is of vital importance. Bagayat in contrast, is an irrigated land where labour and water

intensive farming is practised. Some crops like Sugarcane is entirely dependent on irrigation. However, irrigation usually supplements rain to strengthen the main crop or sustain the subsidiary crops. Small irrigated patches of land with the well as the nucleuse are called 'Malas'. Though the capacity of a well to irrigate the land is limited, farmers generally grow cash crops, which fetch them to good returns.

The existing cropping pattern may not be necessarily the most efficient use of land resources and there is always a scope for change in response to the improvement in technology, economic factors and the nature of demand.

Crops show a market tendency to adopt themselves to a wide range of environments. However, in the state, climate is the principal factor which strongly influence the spatial distribution of crops. The amount of rainfall received and its seasonal distribution are very significant in explaining the spatial variations in the occurrence of a crop along with temperature, relief, edaphic, socio-economic and technological factors.

The geographical area of Maharashtra state is 308000 sq. km. Out of which the net area under agriculture is 17636 thousand hectares i.e. 57.5 per cent. This proportion at national level is less at 43.4 per cent. The proportion of gross irrigated area to gross cropped area at national level is 38.7 per cent, while in Maharashtra state, it is only 16.4 Per cent. Thus, 83.6 per cent of the area under agriculture in the state directly depends on the monsoon. As a result, the per hectare crop yield in Maharashtra in general is lower than that at the national level. Out of total geographical area of Maharashtra i.e. 3,07,583 hundred hectares; the gross cropped area was 2,18,59,400 hectares in 1990-91. About 17.24 per cent of land area fall under the forest.

Since 1990-91, there was slow rise observed in gross cropped area in the Maharashtra state. Which reached its peak of 2,24,04700 hectares in 2001-2002. However, it suffered a reverse trend in 1991-92 due to adverse seasonal conditions and during this year, the gross cropped area in the state come down to 2,01,33400 hectares. Overall 10.22 per cent of increase in gross cropped area is seen in 2010-11 over the base year 1990-91. This is because of the

overall favourable weather conditions. This increase in gross cropped area is also accompanied by the increase in total irrigated area as well as double sown area. In 1990-91, the total irrigated area was 33,19,000 hectares, which increased to 38,12,000 hectares in 2010-11. Whereas, the double sown area has increased from 32,94,7000 hectares in 1990-91 to 48,08,1000 hectares in 2002-2003. This increase in irrigated area and consequently double sown to area both have direct bearing on the cropping patterns. As irrigated area has increased, it will increase the double or triple sown area and as a result we see the changes in cropping pattern of the state.

In our analysis, we have to see the agricultural production and area of following principal crops in Maharashtra state -

- A) Cereals
  - 1. Rice
  - 2. Wheat
  - 3. Jowar
  - 4. Bajara
  - 5. Other Cereals (Barreiy, Raggi, Maize etc.) A'-
- B) Pulses
  - 1. Gram
  - 2. Tur
  - 3. Other Pulses (Urid, Mond, Masoor etc.)
- C) Groundnut
- D) Cotton (Lint)
- E) Sugarcane
- F) Tobacco

Study of the area under different crops assumes importance because, we can, to a great extent, find out the changes in cropping pattern by studying the relative changes in area under different crops, which is a way to study how the cropping pattern changes. Changes in area under crop production can also analyze the change in irrigation facility, agricultural technology etc. which also helps in changing the cropping pattern.

Keeping in view the above factors we have undertaken a comprehensive study of the area under different crop production in Maharashtra during the period from 1990-91 to 2003-2004. In the first instance, we have analyzed the broad categories and then the individual crops.

#### **A) Cereals**

The category of cereals include food crop like Rice, Jowar, Bajara, Wheat, and other cereals include Barely, Maize, Raggi etc. During the period under study the area under this group of crops slowly decreased every year. There is 23.10 per cent decrease in area under cereal crops in 2010-11 over the base year 1990-91, In 1990-91 the total area under cereals was 11142000 hectares which decreased to 8568000 hectares in 2003-2004. (Table No. 2.1(A)).

Among the cereals the major role to this decrease in area was that of Jowar, which has decreased by 29.86 per cent in 2010-11 over the base year 1990-91. Generally, the increasing trend in area has been observed in the case of other cereals, (Barely, Maize, Raggi etc.) area, which had increased by 40.23 Per cent. Actual area under this in 1990-91 was 4,30,000 hectares, which increased to 6,03,000 hectares in 2010-11. The number of factors have influenced this increase in area under other cereals (Barely, Maize, Raggi etc.). During this period Maize is cultivated as a mixed crop along with different cash crops because of it's short duration. Maize is cultivated with Rice, Sugarcane, Chilies etc. Maize is also cultivated as pure crop because of its short duration. Similarly, it can be used (when young) for fodder as well as it can be sold fresh for high value price in the market. But the main factor influencing the increase is irrigated area.

**Table No. 2.1 (A)**  
**Area under Principal Crops in Maharashtra**

(Area in 000' Hectares)

Sr. No.	Crops	1990-91	1997-98	2003-04	2010-11	1991 to 2011 % Growth
		Area	Area	Area	Area	
1	2	3	4	5	6	7
1.	Rice	1581 (7.23)	1477 (6.90)	1535 (6.86)	1558 (6.25)	- 1.45
2.	Wheat	873 (3.99)	747 (3.49)	665 (2.97)	2301 (9.23)	163.57
3.	Jowar	6331 (28.96)	5500 (25.72)	4440 (19.84)	3452 (13.84)	- 45.47
4.	Bajara	1927 (8.81)	1671 (7.81)	1325 (5.92)	1035 (4.15)	- 46.28
5.	Other Cereals	430 (1.96)	505 (2.36)	603 (2.69)	1070 (4.29)	148.83

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
6.	Total Cereals	11142 (50.97)	9907 (46.33)	8658 (38.30)	8990 (36.06)	- 19.31
7.	Gram	673 (3.07)	715 (3.34)	795 (3.55)	1438 (5.76)	113.67
8.	Tur	1008 (4.61)	1006 (4.70)	1046 (4.67)	976 (3.91)	- 3.17
9.	Other Pulses	1576 (7.20)	1546 (7.23)	1595 (7.13)	262 (1.05)	- 83.37
10.	Total Pulses	3257 (14.90)	3267 (15.27)	3436 (15.36)	4038 (16.20)	23.97
11.	Total Foodgrains	14399 (65.87)	13174 (61.60)	12004 (53.66)	13028 (52.26)	- 9.52
12.	Groundnut	881 (4.03)	533 (2.49)	390 (1.74)	357 (1.43)	- 59.47
13.	Cotton (Lint)	2730 (12.48)	3139 (14.67)	2762 (12.34)	7473 (29.98)	173.73

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
14.	Sugarcane	533 (2.43)	541 (2.53)	442 (1.97)	965 (3.87)	81.05
15.	Tobacco	10 (0.04)	9 (0.04)	6 (0.02)	N.A.	N.A.
16.	Total Cash Crops	4154 (19.00)	4222 (19.74)	3600 (16.09)	N.A.	N.A.
17.	G.C.A.	21859 (100.00)	21383 (100.00)	22368 (100.00)	24925 (100)	114.75

Source : Economic Survey of Maharashtra (1990-91 to 2010-11)

Note : The date is parenthesis indicates percentage of the total area.

**TableNo.2.1(B)**  
**Area under. Cereals in Maharashtra**

(Area in 000' Hectares)

Year	Rice	Wheat	Jowar	Bajara	O. Cereals	Total
1990-91	1581	873	6331	1927	430	11,142
1991-92	1572	628	5485	1911	431	10,027
1992-93	1543	680	5921	1908	503	10,555
1993-94	1550	753	6165	1790	497	10,775
1994-95	1538	767	5351	1766	509	9,931
1995-96	1517	702	5557	1665	529	9,970
1996-97	1478	799	5692	1947	552	10,468
1997-98	1477	747	5500	1671	505	9,900
1998-99	1483	1016	4775	1760	570	9,604
1999-00	1520	1049	5191	1736	540	10,036
2000-01	1512	754	5094	1800	664	9,824
2001-02	1514	776	5137	1399	585	9,411
2002-03*	1493	715	4677	1620	682	9,187
2003-04	1535	665	4440	1325	603	8,568
2010-11	1518	1307	4060	1035	1070	8990
Increase %	-1.45	163.57	-45.47	-46.28	148.30	-19.31

Source : Economic Survey of Maharashtra (1990-91 to 2010-11)

Note - \* Tentative

**1) Rice :**

The area under Rice has also decreased by 2.90 per cent in 2010-11 accounting for 15,35,000 hectares over 15,81,000 hectares in 1990-91. The decreasing change in area under Rice is 46,000 hectares in 2010-11 over the base year 1990-91. Area under Rice is continuously declined during the period of study, because, the Monsoon 2004 in Maharashtra has been very irregular affecting the Rice production continuously in the fourth consecutive year. It is the main factor which influences the decrease in area under Rice

that's why the percentage share of area under rice remained at 2,90 per cent in 2010-11 over the base year of 1990-91.

**2) Wheat :**

The area under Wheat has decreased by 23.82 per cent in 2010-11. In 1990-91, the area under Wheat was 8,73,000 hectares, which has decreased to 6,65,000 hectares in 2010-11. The decreasing trend in area under Wheat is 1.02 per cent in 2010-11. The accountable change for Wheat is 2,08,000 hectares over the base year 1990-91. But during the year 1998-99 and 1999-2000, there was some increase in the area by about 10,16,000 hectares and 10,49,000 hectares because of favourable weather conditions. Again, from 2000-2001, the area under Wheat has continuously decreased. But the main factor influencing the decrease in area under Wheat is uncertainty of Monsoon and unfavourable weather conditions in the state.

**3) Jowar :**

Among the cereals, Jowar is the major cereal crop in Maharashtra occupying about 50 Per cent of area under all cereals. This crop also shows a decreasing trend by 29.86 per cent of area in 2010-11. In the year 1990-91, the area under Jowar was 63,31,000 hectares which has decreased to 44,40,000 hectares in 2010-11. The change in area under Jowar has decreased by 9.12 per cent in 2010-11 accounting change for Jowar is 18,91,000 hectares, over the base year 1990-91. This decrease in area under Jowar is mainly due to uncertainty of Monsoon and unfavourable weather conditions.

**4) Bajara :**

The area under Bajara shows a declining trend during the period under study. The area under Bajara has continuously decreased by 31.24 per cent in 2003-2004 over the base year 1990-91. In 1990-91, the area under Bajara was 19,27,000 hectares, which has decreased to 13,25,000 hectares in 2010-11. Difference in percentage share of area under Bajara has decreased by 2.89 per cent in 2010-11 accounting a change in area to 6,02,000 hectares, over the base year 1990-91. The reason for this decrease in area is that, the newly introduced varieties found out to be a most susceptible to the disease like

downy mildew. Therefore, in spite of satisfactory agricultural season in successive years, the area under this crop has decreased.

**5) Other Cereals :**

Other cereals include Barely, Maize, Raggi etc. From this category of cereals, the crops shows uneven trend in other cereals. Similarly, increasing trend in area has been observed in the case of other cereal's area, which has increased by 40.23 per cent. Actual area under this in 1990-91 was 4,30,000 hectares, which has increased to 6,03,000 hectares in 2010-11. Difference in percentage share of area under other cereals has increased by 0.73 per cent during 2010-11 accounting a change of 1,73,000 hectares over the base year 1990-91. The number of factors influenced an increase in area under Maize during this period. Maize is cultivated as a mixed crop along with other cash crops because of its short duration. Maize is cultivated with Rice, Sugarcane, Chilies etc. Maize is also cultivated as a single crop because of its short maturity. Similarly, it can be used as a fodder. It can be sold fresh for high value price in the market. But the main factor influencing the increase in area under other cereals is an increase in double or triple irrigated sown area.

**Table No. 2.2**  
**Area under Pulses in Maharashtra**

(Area in 000' Hectares)

<b>Year</b>	<b>Gram</b>	<b>Tur</b>	<b>Other Pulses</b>	<b>Total</b>
1990-91	673	1008	1576	3257
1991-92	434	1016	1558	3008
1992-93	591	1018	1741	3350
1993-94	681	1031	1721	3433
1994-95	763	1046	1787	3596
1995-96	717	1045	1543	3305
1996-97	750	1040	1535	3325
1997-98	715	1006	1546	3267
1998-99	904	1007	1595	3506
1999-00	933	1041	1632	3606
2000-01	676	1096	1785	3557
2001-02	756	1017	1615	3388
2002-03 *	792	1127	1694	3613
2003-04	795	1046	1595	3436
2010-11	1438	976	262	4038
Increase %	113.67	-3.17	-83.37	23.97

Source : Economic Survey of Maharashtra (1990-91 to 2010-11)

Note - \* Tentative

**B) Pulses :**

Maharashtra state contributes about 1.2 per cent of area under pulses in country. Gram, Tur, Moong are the major pulses' crops grown in most of the districts of the state. Due to different agroclimatic conditions in the state, the change in area, production and productivity are not uniform. During the period from 1990-91 to 2010-11, the area under Pulses remained at 14.90 per cent of the gross cropped area in the state and in the year 2010-11 there is 5.49 per cent rise in area under pulses over the base year 1990-91. In 1990-91, the total area under Pulses crops was 32,57,000' hectares, which has increased

to 34,36,000 hectares in 2010-11. During the year 1994-95, it reached to 35,76,000 hectares. This is because, the agricultural season in 1994-95 and 1995-96 were satisfactory for kharif crops. Except Gram most of the pulses are grown in kharif season. Among the major kharif Pulses, Tur shows 3.76 per cent increase in area in 2010-11 over the base year 1990-91. Other Pulses include Masur, Urid, Moong being a minor pulses sown in small percentage increased by 1.20 per cent in 2010-11 over the base year 1990-91.

The Gram being major pulses crop which is sown in rabbi season had a significant rise in area. This crop shows an increasing trend during the period under study.

**1) Gram :**

The Gram being major pulses crop, is sown in rabbi season which shows a significant rise in area. There is 18.12 per cent rise in area under pulses in the year 2010-11 over the base year 1990-91. In 1990-91, the total area under Gram was 6,73,000 hectares, which has increased to 7,95,000 hectares respectively in 2010-11. This increasing change in percentage terms is 0.48 Per cent in 2010-11 accounting to an area of 1,22,000 hectares. This crop is sown in irrigated as well as non-irrigated fields. This 18.12 per cent increase is mainly due to the increase in irrigation facilities during the period under study.

**2) Tur :**

The area under Tur has also increased by 3.76 per cent in 2003'-04 accounting to 10,46,000 hectares over 10,08,000 hectares in 1990-91 with an increasing change in area In percentage terms is 0.06 per cent accounting to 38,000 hectares over the base year 1990-91. Tur is cultivated as a mixed crop along with other, because of its short maturity. But, the main factor influencing the increase an area under Tur is increasing irrigated area.

**3) Other Pulses :**

Other pulses include Urid, Moong, Masur etc. These crops have also shows an increase of 1.20 per cent of area in 2010-11. In 1990-91, the area under other Pulses (Urid, Moong, Masur etc.) was 15,76,000 hectares which

has increased to 15,95,000 hectares in 2010-11. Increasing change in area is 0.07 per cent in 2010-11 accounting to 19,000 hectares over the base year 1990-91. This crop is sown in irrigated as well as non-irrigated fields and this increase is mainly due to increase in irrigation facilities during period under study.

**C) Groundnut :**

Groundnut is the oilseed crop, which shows a decrease in its area. It has decreased by 55.73 per cent in 2010-11 over the base year 1990-91. The area under Groundnut in 1990-91 was 8,81,000 hectares which has decreased to 3,90,000 hectares in 2010-11. This decrease in area under groundnut could mainly be accounted for by the introduction and gradual adoption of high yielding varieties of kharif Jowar. Mostly the another-crop that might have encroached upon Groundnut area is the Cotton. Besides, the marginal and sub-marginal farmers having small holdings shifted from Groundnut cultivation to the kharif Jowar as their crop pattern is decisively determined by the family requirement of cereals for domestic consumption.

**D) Cotton :**

Area under cotton in Maharashtra do not show a satisfactory trend. Besides, it shows a very slow growth in area under it. This crop shows an increase of 1.17 per cent share in 2010-11. In 1990-91, it was 27,30,000 hectares, which has increased to 27,62,000 hectares in 2010-11. This increasing change in area under Cotton is 0.14 per cent in 2010-11 accounting to 32,000 hectares over the base year 1990-91. Thus cotton as a main fiber crop among the crops grown shows an increasing trend in area and consequently total area under this group had recorded a positive growth by 1.17 per cent.

**Table No. 2.3**  
**Area under Cash Crops in Maharashtra**

(Area in 000' Hectares)

Year	Groundnut	Cotton (L)	Sugarcane	Tobacco	Total
1990-91	881	2730	573	10	4154
1991-92	742	2742	552	10	4046
1992-93	652	2480	470	10	3612
1993-94	659	2479	411	10	3559
1994-95	603	2760	612	10	3985
1995-96	511	3065	670	9	4255
1996-97	576	3085	619	10	4290
1997-98	533	3139	541	9	4222
1998-99	543	3199	609	9	4360
1999-00	540	3254	686	9	4489
2000-01	490	3077	687	8	4262
2001-02	429	3105	664	6	4204
2002-03 *	355	2617	599	6	3577
2003-04	390	2762	442	6	3600
2010-11	357	7473	965	N.A.	--
Increase %	-59.47	173.73	81.05	--	--

Source : Economic Survey of Maharashtra (1990-91 to 2010-11)

Note - \* Tentative

**E) Sugarcane :**

Sugarcane occupies a pride of place in the agricultural economy of Maharashtra as it is one of the important cash crops. Sugarcane grows best on well-drained aluminum and black cotton soil areas in the state, where, irrigational facilities are available. It is an important cash crop cultivated in 4,42,000 hectares (1.97 per cent of harvested area). Some is used as raw material for sugar and jaggery (gur) factories of the state. The cultivation of Sugarcane is concentrated in a few areas, where sugar factories are located.

This crop reflects a decrease of 17.07 per cent of area in 2010-11. In 1990-91, the area under Sugarcane was 5,33,000 hectares which has decreased to 4,42,000 hectares in 2010-11. During the last four years, from the period under study 1998-99, 1999-2000, 2000-2001 and 2001-2002, it has been seen an increasing trend which accounted to 6,64,000 hectares in 2001-2002. Overall, there is a negative growth in the area under Sugarcane. This decrease was mainly due to the excess use of chemical fertilizers and water. Use of technology is at the increasing side. Lack of credit is one of cause of low production.

#### **F) Tobacco :**

From the drugs and narcotics group. Tobacco is the important crops which is grown in Maharashtra. It shows a very negative growth in area under it. This crop shows a decreasing of 40.00 per cent of area in 2010-11. The area under Tobacco was 10,000 hectares in 1990-91, which has decreased to 6000 hectares in 2010-11. There is a slow but negative trend in area under Tobacco during the period under study.

## **2.5 CONCLUSIONS**

The broad conclusions that emerge out of this study in cropping pattern in Maharashtra state during the period 1990-1991 to 2003-2004 is summarised as follows :

#### **I) Total Foodgrains :**

Area under foodgrains cultivation shows a decline trend of 16.63 per cent in 2003-2004 over the base year 1990-1991. In 1990-91 area under foodgrains was 1,43,99,000 hectares, which has decreased to 1,20,04,000 hectares in 2010-11 by a decreasing change in area under foodgrain at 12.21 per cent in 2010-11 over the base year 1990-91.

Among the area under cereal's cultivation, the percentage decrease is of 23.10 in 2010-11 over the base year 1990-91. The area under Rice, Wheat, Jowar and Bajara cultivation shows a declining trend of 2.90 per cent, 23.82

per cent, 29.86 per cent and 31.24 per cent in 2010-11 over the base year 1990-91. The reason for this decline is the cropping pattern, is that is the share of the other cereals and pulses has increased and that of the principal Cereals declined giving some evidences of diversification in this direction. Area under other cereals including Maize, Raggi, Barely shows a significant rise by 40.23 per cent in 2003-2004 over the base year 1990-91.

The area under Pulses cultivation shows a percentage increase of 5.49 in 2010-11 over the base year of 1990-91. Among the area under Gram show a significant increase of 18.12 per cent in 2003 over the base year 1990-91. The area under Tur and other pulses including Urid, Moong, Masoor shows a increasing trend of 3.76 per cent and 1.20 Per cent in 2010-11 over the base year 1990-91. These crops were sown in irrigated as well as non-irrigated fields. Its increase is mainly due to increase in irrigation facilities during the period under study.

## **II) Cash Crops :**

The area under cash crops shows a declining trend during the period 1990-91 to 2010-11. The percentage decrease in area under cash crops is 13.33 in 2010-11 over the base year 1990-91.

Groundnut is the oilseed crop, which shows a decline in its area under cultivation and percentage decrease in area under Groundnut was 55.73 in 2010-11 over the base year of 1990-91. The reason for this decline may be of a shift to cultivate other cash crops like Cotton with the development of irrigation. Secondly, in drought prone areas, farmers have shifted from Groundnut cultivation to Maize, Barely, Raggi. In addition to family requirements of Cereal's necessitage cultivation of Cereal's instead of Groundnut especially by small farmers.

The area under Sugarcane shows a declining trend during the period 1990-91 to 2010-11. The percentage decrease in area under Sugarcane cultivation is 17.07 per cent in 2010-11 over the base year 1990-91. The reason for this decline is an increase in gross cropped area by about 23.28 per

cent in 2010-11 over the base year 1990-91. Among the area under Tobacco cultivation shows a decrease of 40.00 per cent in 2010-11 over the base year 1990-91. The reason for this decline is a shift in cropping pattern to cash crops like Cotton with the development of irrigation.

Cotton is the only cash crop showing an increasing trend in area under cultivation during the period under study. The percentage increase in area under Cotton cultivation is 1.17 per cent in 2010-11 over the base year 1990-91. This increase is mainly due to the increase in irrigation facilities during the period from 1990-91 to 2010-11.

## **CHAPTER - III**

### **CHANGES IN LAND USE PATTERN**

#### **3.1 GEOGRAPHICAL PROFILE OF MAHARASHTRA**

##### **3.1.1 Location :**

The present state of Maharashtra was born on 1st May, 1960. It is largely inhabited by Marathi speaking people and it is an expression of their cultural linguistic and social homogeneity.

This state forming a major portion of the Indian peninsula occupying a central place in Western India. It is bounded on east, north and north-east by parts of Madya Pradesh and Karnataka and on west by the Arabian sea. The state lies between 15°45' to 21°06" north latitudes and 72°36' to 80°45' east longitudes. The area of the state is 3,07,762 Sq, Km. and occupies 9.36 per cent of the total area of land of India. The east-west length of the state is about 800 km. North-south width is about 700 km and the total length of the coastline is about 720 km.

##### **3.1.2 Physiography :**

The physiography has greatly influenced by the socio-economic life of the Maharashtra. Though two outstanding divisions like vast plateau sloping eastwards and narrow coastal lowland to the west are dominant, physiographically the land of Maharashtra can be defined as follows :

1. The Konkan lowlands
2. The Sahyadri ranges
3. The Deccan plateau
4. Wardha-Wainganga Valley and,
5. Tapi-puma basin.

##### **1) The Konkan Lowlands :**

The narrow strip of land. between the Arabian sea on the west and the Sahyadri range on the east is called Konkan. It stretches north-south for 720

kms and its width ranges between 45 to 75 kms. It is about 31,100 Sq. Km in area. The zones fall in to three longitudinal sub-divisions, the coastal belt, the heavy monsoon rain during the summer and extreme humidity mark, its climate. Its rivers flow transversely. During the monsoon they are ranging torrents, while in other part of the year, they are either rivulets or mostly dry.

### **3.1.3 Climate :**

The climate of Maharashtra is typically monsoonal in character with four months of rainy season followed by eight months of relatively dry period of winter and summer. The annual climatic cycle consists of four well marked seasons, namely the cold season, hot season, south-west monsoon and post-monsoon season.

### **3.1.4 Soil :**

The following three types of soil-lateric red soils, mixed red and black soils, and black soils are found in the state.

Lateric soils are present in the hilly track of heavy rainfall in the Konkan region and western' ghats- These are formed in situ under conditions of high rainfall with a alternating wet and dry period. These soils are red to reddish yellow in colour. Immense leaching during rainy season has rendered these soils rich in sesqui-oxides and poor in lime organic matter and a great extent the available phosphorus and potash. This process has thus removed from soil all the bases giving it distinctly acidic character with pH value ranging between 4.5 to 6.0. These soils are usually loamy in texture, porous, fairly deep but with lower tenacity of moisture. The clays are mostly kaolinities.

Mixed red and black- soils are formed from the mixture of decomposed materials from the Deccan traps and laterites and these show best development in the transitional areas where rocks of the above two types occur.

Deep black soils are heavy textured with a clay content ranging from 40 to 60 per cent. These are highly fertile and thus, support dense vegetational growth. They are alkaline, with pH varying from 7.5 to 8.5 and are plastic and sticky when wet and very hard when dry. The main clay mineral is montmorillonite. These soils under strong swelling and severe shrinkage under changing moisture conditions leading to heavy fissuring and deep cracking on drying medium black soils occur extensively in the state and exhibit more or less the same characters as shown by Deep Black Soils but to a lesser degree. They are mildly alkaline and poor in nitrogen and organic matter but contain adequate amount of potash and lime, shallow black soils are relatively low in organic matter and usually quite low in fertility.

### **3.2 CHANGES IN LAND USE PATTERN :**

Agriculture is an important sector in the state economy as about 65 percent of the population in the state depends on agriculture for livelihood. In spite of the rapid growth of industries and service sector in Maharashtra, agriculture still remained an important economic activity. The geographical area of Maharashtra state is 308,000 sq. km out of which the net area under agriculture is 17,600 thousand hectares i.e. 57.2 per cent. This proportion at national level is less at 43.4 per cent. The proportion of gross irrigated area to gross cropped area at national level is 38.7 per cent, while in Maharashtra state it is only 16.4 per cent. Thus, 83.6 per cent of the area under agriculture in the state directly depends on monsoon. As a result, the per hectare crop yield in Maharashtra is in general lower than that at the national level. Gross cropped area in Maharashtra was 72.78 per cent of total geographical area of Maharashtra State. Out of the gross cropped area in Maharashtra, the area used "more than once is 15.56 percent or 47,862 hundred hectares. Out of (the total geographical area 16.95 percent land is under forest.

### **3.2.1 Classification of Land Use**

#### **A) Forest :**

Area under forest includes all classed as forest under any legal enactment dealing with forest or administrated as forest whether state owned or private or whether worded as maintained an potential forest land.

#### **B) Barren and Uncultivable land :**

This covers all barren and uncultivable lands like mountains, deserts etc. Land which cannot be brought under cultivation unless at a high cost is classed as unculturable, whether such land is in isolated block or within cultivated holdings.

#### **C) Land put on non-agricultural uses :**

This stands for all lands occupied by buildings, roads, railway or under water arid other lands put to uses other than agriculture.

#### **D) Permanent Pastures and other grazing lands :**

These cover all grazing lands whether they are permanent pastures and meadarves or not. Village common grazing land are included under this head.

#### **E) Miscellaneous trees, crops and groves :**

Under this class all cultivable lands which are not included under 'net gross sown' is put to agricultural use land under casurime, trees, grasses, bamboo, bushes and other groves for fuel etc. which are not included under orchards shall be classed under this category.

#### **F) Culturable Wastes :**

These include all lands available for cultivation whether not taken up for cultivation or taken up for cultivation once, but not cultivated during five years.

#### **G) Fallow land other than current fallow :**

This includes all lands which were taken up for cultivation for a period of not less than one year and not more than five years. The reason for keeping such lands fallow may be one of the following, 1) Poverty of cultivator, 2) Inadequate supply of water, 3) Material climate, 4) Sitting of canals and rivers, 5) Narrative nature of farming.

**H) Current fallow :**

This class comprises of cultivated areas which are kept fallow during the current year. If any seedling area is not cropped again in the same year, it may be treated as a current fallow.

**I) Net area sown :**

This consists of net area sown with crops and orchards.

**3.2.2 Land Utilization**

**A) Forest :**

Out of total geographical area 16.95 per cent land is under forest. There is close association between the nature of the terrain, the amount of rainfall received and the area under forests. The Western Ghats and the foothill section, the Satpuras and the Melghat and the hill in the eastern part are the three areas of concentration of forests.

The area under forest in the state has remained more or less constant since 1990-1991. The area under forest in 1990-1993 is 5135.6 hundred hectares or 16.91 per cent which little increased to 521148 hundred hectares or 16.93 per cent in 2001-2004. Change in area under forest is 792 hundred hectares in 2001-2004 over the base year 1990-1993.

The proportion of total area occupied by the forest in Maharashtra has remained 52148 hundred hectares or 16.5 per cent which is little less as compared to that of India (22.9 per cent). Forests are classified into three types, 1) Reserved, 2) Protected and 3) Unclassed forest. Reserved forests are intended mainly for timber production and grazing/ cultivation is generally not allowed in them. Right of grazing/ cultivation under certain limitations and restrictions are allowed in protected forests. The unclassified forests refer to the inaccessible forests or unoccupied waste.

**B) Land not available for Cultivation :**

Land not available for cultivation is two types i.e. Barren and uncultivable land, and land put to non-agricultural uses. Out of total geographical area 10.05 per cent land comes under land not available for

cultivation. Barren and uncultivable lands account for 5.59 per cent of the state's area. The Western Ghats and the Konkan region have a relatively higher proportion of these lands mainly due to adverse physiographic conditions like rugged hilly areas (Nashik, Ahmednagar, Pune and Satara districts). Steep slopes, rack expousers, lateric cover (in Ratnagiri district).

The area under this category shown increasing trend in its area. In 1990-93 area under this category was 16,159 hundred hectares or 5.25 per cent which increased to 17,207 hundred hectares or 5.59 per cent in 2001-04. Change in area under barren and uncultivable land is 1047 hundred hectares or 0.34 per cent in 2001-04 over the base year 1990-93. This class of land did not show significant changes during the period under study, and covered around 5.25 to 5.59 per cent of total geographical area.

Land put to non-agricultural uses accounts for 4.46 per cent in 2001-04 of the state's, area under this category shows an increasing trend in its area. In 1990-93, area under this category was 11,477 hundred hectares or 3.73 per cent which increased to 13,728 hundred hectares or 4.46 per cent in 2001-04.

### **C) Other Uncultivated Land :**

Out of total geographical area in Maharashtra 7.81 per cent land is under other uncultivated land which is divided into culturable waste, permanent pastures and grazing land and land under tree, crops and groves etc.

Culturable waste includes all land available for cultivation or taken up for cultivation once but not cultivated during reference year and the last five years or more in succession for one reason or the other. In 1990-93 cultivable wastes occupied 9601 hundred hectares or 3.12 per cent. It decreased to 9131 hundred hectares or 2.96 per cent in 2001-04. There is a little decrease of 4.89 per cent in 2001-04 over the base year 1990-93.

**Table No. 3.1**  
**Land Utilization In Maharashtra**

(Triennial Average Area in 00' Hectares)

<b>Sr. No.</b>	<b>Category</b>	<b>1990-93</b>	<b>1995-98</b>	<b>2001-04</b>	<b>Difference</b>	<b>Change Area</b>	<b>Growth %</b>
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>
1.	Geographical	3,07,583	3,07,583	3,07,583	---	---	--
2.	Forests	51356 (16.69)	51482 (16.73)	52148 (16.95)	0.25	792	1.54
3.	Barren and Uncultivated Land	16159 (5.25)	15436 (5.01)	17207 (5.59)	0.34	1047	6.48
4.	Land put to non-agri uses	11477 (3.73)	13497 (4.38)	13728 (4.46)	0.73	2250	19.61
5.	Culturable Waste Land	9601 (3.12)	9601 (3.12)	9131 (2.96)	-0.16	-470	-4.89
6.	Permanent Pastures and Grazing Land	11476 (3.73)	11733 (3.81)	12491 (4.06)	0.34	1015	8.84

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>
7.	Land under miscellaneous and groves tree crops	2905 (0.94)	3101 (1.00)	2458 (0.79)	-0.14	-447	-15.39
8.	Current Fallow	12067 (3.92)	10602 (3.44)	12386 (4.02)	0.10	319	2.64
9.	Other Fallow	10942 (3.55)	13630 (4.43)	12027 (3.91)	0.35	1085	9.91
10.	Net Area Sown	181599 (59.04)	178499 (58.03)	176006 (57.22)	-1.82	-5594	-3.08
11.	Area sown more than once	29339 (9.53)	37246 (12.10)	47862 (15.56)	6.02	18523	63.13
12.	Gross Cropped Area	210605 (68.47)	215746 (70.14)	223867 (72.78)	4.31	13263	6.29

Notes : The Data in parenthesis indicate percentage of the total area.

\*Source : Economic Survey of Maharashtra (1991 to 2004).

Permanent pastures and grazing lands show a little increase in its area. In 1990-93, area under this category was 11,476 hundred hectares or 3.73 per cent which increased to 12,491 hundred hectares or 4.06 per cent in 2001-04. Change in area under this category is 1,015 hundred hectares or 8.84 per cent in 2001 -04 over the base year 1990-93.

Land under miscellaneous tree crops and groves show a little decrease during the period under study. The land under this category is 2905 hundred hectares or 0.94 per cent in 1990-93 which has decreased to 2458 hundred hectares or 0.79 per cent in 2001-04. Change in land under this category is -447 hundred hectares or 15.39 per cent in 2001-04 over the base year 1990-93.

**D) Fallow Lands :**

In Maharashtra fallow land occupies 7.93 per cent of total area, which is equally divided between current fallow and other fallows. But fallow is a part of crop rotation in the same area. However, the proportion of land kept under fallow is resulted to the amount and distribution of rainfall in the semi arid areas of the state. The proportion of current fallow shows a little increase of about 2.64 per cent in 2001-04 over the base year 1990-93. The change in area under current fallow is 319 hundred hectares or 2.64 per cent in 2001 over the base year 1990-93.

The land under other fallow shows an increasing trend during the period under study. In 1990-93, other fallow land occupied 10,942 hundred hectares or 3.55 per cent which has increased to 12,027 hundred hectares or 3.91 per cent in 2001-02. The change in land under other fallow is 1085 hundred hectares or 9.91 per cent in 2001-04 over the base year 1990-93.

**E) Net Sown Area :**

Net sown area covers the net area sown and area sown more than once. The area under this category is 72.78 per cent in 2001-04. Spatial distribution of NSA to a large extent is influenced by variation in relief. River valleys, flood plains, low lands and low plateaus with gentle slopes exhibit a high proportion of land under cultivation.

The proportion of net sown area shows a declining trend during the period under study. In 1990-93, net sown area occupied 1,81,599 hundred hectares or 59.04 per cent which has decreased to 1,76,006 hundred hectares or 57.22 per cent in 2001-04. The change in area under this category is 5,594 hundred hectares or 3.08 per cent in 2001-04 over the base year 1990-93.

In some areas of the study, more than one crop is grown mostly with the help of irrigation. This has a vital importance from the point of view of the agricultural economy. However, only 15.56 per cent of gross cropped area is sown more than once. The area under sown more than once shows a significant change in its area. In 1990-93, area under this category was 29339 hundred hectares or 9.53 per cent which has increased to 47,862 hundred hectares or 15.56 per cent in 2001-04. The change in area, under sown more than once is 18523 hundred hectares or 63.13 per cent in 2001-04 over the base year 1990-93. This increase is mainly due to the increase in irrigation facilities during the period under study.

#### **F) Gross Cropped Area :**

This category includes net sown area, and area sown more than once in a year. Net sown area consist of net area sown with crops and orchards excluding the area sown more than once. Surprisingly inspite of the progress made in other aspect of agriculture, the net sown area in Maharashtra has changed much. It has declined from 1,81,599 hundred hectares or 59.04 per cent in 1990-93 to 176006 hundred hectares or 57.22 per cent in 2001-04. Maharashtra accounts for 12.6 per cent of the countries net sown area. However, as a proportion of the geographical area, Maharashtra has more NSA (57.22 per cent) then that of India (43.26 per cent (1995-96).

The area sown more them once however, shows an increasing trend from 29,339 hundred hectares or 9.53 per cent in 1990-93 to 47,862 hundred hectares or 15.56 per cent in 2001-04. This phenomenal increase is 63.13 per cent in 2001-04 over the base year 1990-93. This increase is due to an increase in the area under irrigation by different sources, that too in the last decades.

Gross cropped area represents the sum of net area sown and the area sown more than once. Therefore, gross cropped area also exhibits increasing trend "during the period under"-study. It has increased from 2,10,605 hundred hectares or 68.47 per cent in 1990-93 to 2,23,867 hundred hectares or 72.78 per cent in 2001-04. Maharashtra state accounts for 11.4 per cent of India's gross cropped area but Maharashtra's proportion of Gross cropped area represent the geographical area of the state. Which is higher than (69.2 per cent) that of India at 56.75 per cent (1995-96).

### **3.3 GROSS CROPPED AREA AND NET CROPPED AREA IN MAHARASHTRA :**

The land use statistics in 2001-02 shows a significant changes in land use pattern during the period under study. The gross cropped area accounting for 2,23,867 hundred hectares or 72.78 per cent of the total geographical area of the state. The net sown area accounts to 176006 hundred hectares or 57.22 per cent and the area sown more than once accounts to 47,862 hundred or 15.56 per cent of the total geographical area in the state.

The gross cropped area slowly increased every year during the period under study. There is 6.29 per cent increase in area under gross cropped area in 2001-04 over the base year 1990-93. The total gross cropped area was 2,10,605 hundred hectares or 68.47 per cent in 1990-93 which has increased to 2,23,867 hundred hectares or 72.78 per cent in 2001-04. Change in area under gross cropped area is 13,263 hundred hectares or 4.31 per cent in 2001-04 over the base year 1990-93. This increase is mainly-due to increase in double sown area and irrigated facilities during the period under study.

**Table No. 3.2**  
**Irrigated Area In Maharashtra**

(Triennial Average Area in 00' Hectares)

<b>Sr. No.</b>	<b>Category</b>	<b>1990-93</b>	<b>1995-98</b>	<b>2001-04</b>	<b>Difference %</b>	<b>Change Area</b>	<b>Growth %</b>
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>
1.	Gross Cropped Area	2,10,605 (68.47)	2,15,746 (70.14)	2,23,867 (72.78)	4.31	13,263	6.29
2.	Net Sown Area	1,81,599 (59.04)	1,78,499 (58.03)	1,76,006 (57.22)	-1.81	-5,594	-3.08
3.	Double Sown Area	29,339 (9.53)	37,246 (12.10)	47,862 (15.56)	6.02	18,513	63.13
4.	Gross Irrigated Area	32,730 (15.54)	36,707 (17.01)	36,683 (16.38)	0.84	3,953	12.07
5.	Net Irrigated Area	26,223 (80.12)	30,357 (82.70)	29,727 (81.03)	0.91	3,503	13.36
6.	% of Net Irrigated Area to Net Crop Area	14.44	17.01	16.89	2.44	---	16.94
7.	% of Total Irrigated Area to Gross Cropped Area	15.55	17.01	16.38	0.83	--	5.33

Note : The data in parenthesis indicate percentage to the total

\*Source : Economic Survey of Maharashtra.

Net sown area shows a decrease in its area. It had been decreased by 3.08 per cent in 2001-04 over the base year 1990-93. In 1990-93 the net sown area was 1,81,599 hundred hectares or 59.04 per cent which has decreased to 1,76,006 hundred hectares or 57.22 per cent in 2001-04. This little decrease is 1.81 per cent in 2001-04 over the base year 1990-93. Change in area under net sown is 5,594 hundred hectares in 2001-04 over the base year 1990-93.

Among the area sown more than once sown shows a significant increasing trend in its area. In 1990-93, the area under double sown was 29,339 hundred hectares or 9.53 per cent which has increased to 47,862 hundred hectares or 15.56 per cent in 2001-04. There is 63.13 per cent increase in area under double sown in 2001-04 over the base year 1990-93.

Generally, gross cropped area shows increasing trend during the period under study. This increase is mainly due to increase in double sown area. This double sown area increased because of irrigation facilities increased during the period under study. But net sown area shows a negative trend in its area. This declining trend is mainly due to the reason that the farmers use the land for another productive purposes.

### **3.4 GROSS IRRIGATED AREA AND NET IRRIGATED AREA IN MAHARASHTRA**

Irrigation is an important input for the development of agriculture. It is regarded as an integrated part of sound infrastructure and the basic ingredient of agricultural activity. To be successful and well developed agriculture requires supply of water at regular interval and that to in required quantities. Modern agricultural technology such as use of yielding varieties of seeds, use of fertilizers and pesticides can be adopted only when the assured water supply is available.

For the country like India, where 27 per cent national income comes from agriculture and about 65 percent of the total labour force engaged in agriculture is a unsustainable imbalance and creates dualism in the system. Moreover, erratic monsoon losses the confidence of the farmers. To surpass

this danger of uncertainty of rainfall irrigation i.e. artificial supply of water to crop is required. About 16.89 per cent of the net sown area in the state is irrigated which is much less than the national average of 38 per cent. Relatively high intensity of irrigation is observed in the western upland districts of the state along with Chandrapur, Gadchiroli and Bhandara in east. Here, wells, canals and lift irrigations are developed simultaneously. The moderate development of irrigation is noted in central driver part, whereas poor development is remarkable in western Vidharbha region. There is a plenty of scope for bringing additional area under irrigation.

In 1990-93 net irrigated area was 26,223 hundred hectares which has increased to 29,727 hundred hectares in 2001-04. There is a 13.36 per cent growth of increasing area under irrigation during 2001-04 over the base year 1990-93. It is observed that the percentage of gross cropped area to gross irrigated area is little changed by 5.33 per cent in 2001-04 over the base year 1990-93.

Thus, about 80 per cent of cultivated land under irrigation in Maharashtra gains the existing irrigation potentials. This is no doubt possible due to increasing irrigation schemes in the state.

### **3.5 CONCLUSIONS**

The broad conclusions that emerge from the study of land use pattern in Maharashtra during the period 1991 to 2004 are summarized as follows :

Since the beginning of planned economic development, not a very significant changes have occurred in the different land categories. The area under forest remained unchanged round about 16.95 per cent of the total geographical area. The land put to non-agricultural uses has been increased from 11,477 hundred hectares or 3.73 per cent in 1990-1993 to 13,728 hundred hectares or 4.46 per cent in 2001-04. This is bound to occur as the development process gets accelerated and consequently the process of organization and industrialisation gets accelerated. The agricultural lands are being increasingly converted into the non-agricultural lands for dwelling and

industrial purposes. This reflected in a decrease in the net sown area over the period. In concern to the other uncultivated land use category, it did not make any contribution to the net area shown for the whole period. The category of other uncultivated lands shows an increasing trend over the period. The fallow land has made a small contribution to net sown area during the period under study.

However, the area sown more than once registered an increasing trend. It was 9.53 per cent or 29,339 hundred hectares in 1990-93 which steadily increased to 47,862 hundred hectares or 15.56 per cent in 2001-04, because of increasing irrigation facilities in the state. As a result gross cropped area has increased to 2,23,867 hundred hectares or 72.78 per cent in 2001-04 over the base year 1990-93. The major contribution to the gross cropped area should come from the area sown more than once. The gross cropped area is likely to increase only through bringing agricultural lands under multiple cropping and the multiple cropping is possible only when increasing irrigation facilities are made available through construction of minor irrigation dams. We are therefore, of the views that, with a view to increasing gross cropped area, emphasis should be placed on irrigation in the drought prone by dry tracts of the state.

## **CHAPTER - IV**

### **CHANGE IN NEW AGRICULTURAL TECHNOLOGIES**

#### **4.1 INTRODUCTION**

The Technology has an important, role in agriculture and economic development. However, in agriculture, the pattern of technology depends not only on the quality of available technology, but also-on a number of factors like infrastructure, weather conditions, socio-economic policy and environment. Any positive interaction of technology, with these variables determines the pattern of technology. Adoption of these factors in turn influence the agricultural growth.

Since the mid 1960's there has been a rapid increase in agricultural production in India as a result of diffusion of package of improved cultural practices involving High Yielding Varieties of seeds (HYVP), use of fertilizer, irrigation, pesticides, farm mechanization etc. The new technology will generate income and employment to the rural masses.

#### **4.2 CONCEPT OF TECHNOLOGY**

Technology means the knowledge, the skill and all the available techniques applied in production to increase the output. It indicates the input mix, in the production of an unit of output. It helps to provide greater output from a given amount of input or it plays an important role in utilization of available resources. Vernon W. Ruttan<sup>1</sup> points out that, "for an analytical purposes it is convenient to use the term technology referred the body or stack of techniques, procedures or Ways of conducting economic activities. The level -of technology can be conceptualized in terms of an aggregate production function whose parameters reflect all of the technical production possibilities currently available." Specifically technology may be defined in terms of the proportions in which land, labour and capital are combined into the production of a unit of output. It is a function of the technological change and

relative input prices. Dr. V.B. Jugale<sup>2</sup> has explained that, "agro-technical progress is the one that increase the agricultural productivity of both qualitative and quantitative in the same proportions." J. G. Panse and D. Shinge<sup>3</sup> states that, "technological change in agriculture consists of adoption of farming techniques developed through research which in its wake is calculated to bring about diversification and increase of production and greater economic returns to the farmers." C. H. Hanumantha Rao<sup>4</sup> defined, "Technological change in agriculture as the use of new or modern inputs such as fertilizer, high yielding varieties of seeds, tractors, pumpsets, threshers and harvest combine etc. Techniques refer to the actual mix of input factors and it is a function of both technology and relative prices of input factors. Thus technological change may lead to change in techniques." Madhusudan Ghosh<sup>5</sup> states that, "when techniques of production is merely identified with a vector of inputs, any change in the techniques of production can be interpreted as a partial or complete replacement of the traditional variety of inputs by a better quality of technologically advanced inputs. New agrarian technology comprises; HYVP seeds, irrigation, tractors, threshers, insecticides and pesticides, fertilizer etc."

From the analysis of the statements of the scholars regarding the agricultural technology it is realized that agricultural technology is nothing but all the techniques which are used in the field of agriculture to increase the per acre yield of agriculture. Agricultural technology consists of varieties of inputs and these inputs are essential to raise the agricultural production.

### **4.3 FACTORS AFFECTING THE AGRICULTURAL TECHNOLOGY**

There are number of factors affecting the process of adoption of technology. E.O Heady<sup>6</sup> explains the causes for slow rate at which farmers adopt technology . They are; 1) lack of knowledge. 2) lack of capital, 3) uncertainty regarding productivity, 4) managerial requirements and,

5) price ratios and economic instability. Economic causes are the importance factors for the slow adoption of the technology.

The important factors which are affecting the adoption of new technology in agriculture are-

#### **4.3.1 Poor Economic conditions of the farmers**

In the process of adoption of new technology, a farmer has to purchase new inputs like seeds, fertilizer, implements, machines etc. This requires finance. But in most of the less developed countries, farmers are generally poor. So, the adoption of new technology's slow. In order to speed up the adoption of technology, the government as well as the financial institutions should provide cheaper credit facilities for adoption of a new technology.

#### **4.3.2 Lack of Education and Extension facilities**

Education is one of the most important factor in determining the adoption of a new technology. In order to understand a new technology education is required. And to follow a new technology farm research centered to form the extensions services are essential . Harris<sup>7</sup> points out that, "extension particularly, in the case of use of fertilizer "is very important farm view of its efficient and intelligent use." But due to the lack of proper education and lack of existence of effective extension agencies in less developed countries the adoption of technology is very slow.

#### **4.3.3 Uncertainty**

The process of adoption of new technology is very much affected by the uncertainty of the increased yield and prices of the product. In most of the less developed countries , the farmers are poor and they are ready to take risk under such uncertainties . So ,the adoption of technology is very slow and poor.

#### **4.3.4 Managerial Requirements**

Lack of managerial requirements slow the process of technology, because, in most of the backward countries, the farmers are illiterate and they are unable to manage the adopted technology which requires certain abilities. The managerial ability has become difficult for the farmers to implement it, hence, it slow the process of adoption of technology.

#### **4.3.5 Size of the Holdings**

That is a positive relationship, between the size of holdings and the adoption of technology. Generally, large farmers adopt new technology, because their size of land holding is large and financially they are sound. But in the case of marginal and small farmers the adoption of new technology is very difficult because their land holdings are very small and financially they are very weak. So, it stow down the adoption of technology.

#### **4.3.6 Nature of Society**

In a society, where people are educated, intelligent and respective to new ideas. Adoption of technology is very easy. But in a traditional society, where the people are conservative with narrow outlook traditions and superstitions the adoption of technology is very slow. C. Rajagopalan and Jaspal Singh<sup>8</sup> point out that religious beliefs, superstitions, ignorance, expenses on marriages , poverty, administrative structure, non-availability of agricultural inputs on reasonable terms, the unremunerative and insecure nature of agriculture occupation and jobs, away from home, are same of the factors hindering the adoption of technology.

The government as well as the NGOs and other agencies should make sincere efforts to eradicate these problems which have been existing in the path of adoption of technology in agriculture and facilitate individual farmers as well as the society as whole to reap the scenario of technological progress in agriculture. Then, it is possible to achieve prosperity in agriculture.

#### **4.4 IMPORTANCE OF TECHNOLOGY IN AGRICULTURE**

Technology plays an important role in all production enterprises. It is most important factor in increasing the yield from any production efforts. Technology change in agriculture is still more important because the factor, land is inelastic in supply. If agriculture is followed on traditional lines production can not be increased to meet the need of growing population in the nation. Application of modern technology in the form of improved inputs increased the farm productivity even if the land is less fertile. T.W. Schultz<sup>9</sup> explains, "the man who farms as his forefathers did not produce much no matter how rich the land or how hard he works. The farmer who has access to and knows how to use what science knows about soils, plants, animals and machines can produce an abundance of food though land be poor. Need he work nearly so hard and long." Yet in most of the underdeveloped countries agriculture is followed on the traditional lines.

Individual farmers as well as the society as a whole will be the recipients of immense benefits of technology progress. The farmers will get the benefit because new technology help to produce more output with the same resources or the same output at low cost. Hence the profit of the farmer increases at least in the foreseeable future. Technology increases the production of agricultural goods, thus in turn, increase the supply of essential goods. So, consumer will get food grains easily at reasonable prices. Subrata Ghatak and Ken Ingersent<sup>10</sup> write, "with some reservations, technological progress is beneficial both to individual and society as a whole. Producers adopting improved techniques of production benefit at least in the short run, consumers and nation stands to gain from increased aggregate supplies either through the relief of actual physical scarcity or lower price or both."

Adoption of modern technology in agriculture helps the individual farmers as well as the nation as a whole to attain prosperity in the growth of agriculture. Which in turn tends to help overall economic development of the country.

The adoption of new technology in agriculture has been offering a number of benefits to the individual farmers. Some of the benefits of technology are given below

#### **4.4.1 Promotes Self— sufficiency in Food**

The technology has played a significant role in increasing food production in the world, thereby has adequately met the food requirements of the population. Due to increase in the availability of foodgrains, availability of proteins and calories has also increased. Some of the HYVP have higher protein content. In less developed countries population is increasing at faster rate and as such food requirements are also growing. Modernization of agriculture's the only solution to meet this additional demand for foodgrains. E. O. Heady rightly pointed out that, " technological progress in agriculture is relatively more important for densely populated and new independent countries of Asia, Africa and western Europe. It is the technology progress in agriculture alone, which has allowed the food production rate in western world to out pace the population growth rate. Increased food production in poor under developed countries will only provide food self sufficiency but the super plus food production will be a source of earning foreign exchange for the nation." Thus the adoption of modern technology in agriculture will increase the food production and provide self sufficiency and food security to the nation as a whole.

#### **4.4.2. Promotes Employment Opportunities**

Most of the underdeveloped countries are facing the problem of unemployment. Hence, there is a great need to increase the employment opportunities in agriculture. The adoption of technology in agriculture increases the employment opportunities. This is due to the Use of fertilizer, weeding, irrigation, harvesting etc., which requires more labour. The use of HYVP increase the area under a double crops, which increases the employment opportunities. V. T. Raju<sup>12</sup> using the regression an employment

states that, "new agriculture technology has significant to an increase in the employment of labour, the application of fertilizer has significantly contributed to an increase in employment followed by irrigation, improved seeds and plant protection chemicals". Thus the application of new technology in production but also increase an employment opportunities which reduces the effects of unemployment and underemployment problems from the society.

#### **4.4.3. Increase Production and Productivity of Agriculture**

The technology makes the production possible and technological change helps to production more with the some resources. The selection of appropriate technology helps to increase the pre-hectare output in an economy . Further, the increase in agriculture productivity is the main cause of agricultural growth in any country. Agricultural productivity only depends upon natural factors like rainfall, soil, weather conditions etc. but also the technological factors like technological improvements. In the recent years new inputs like HYVP seeds, fertilizers, irrigation, pesticides and modem implements have increased the productivity.

#### **4.4.4 The level of income of the farmers**

The adoption of technology increases the per hectare output. It also leads to greater marketable surplus and adds to the gross income of the fanners. Milton M. Shodgrass and Lather T. Wallace.<sup>13</sup> points out that, "the effect of technology on the farmer's gross income is adopted, e.g. the farmer who was an, "early adopter" and used hybrid seeds corn before the majority of his neighbours did, was able to increase his gross and net income considerably resulting in higher yields per acre harvested, his dullar return per acre was higher with relatively little additional cost. However, all commercial corn produces hybrid seed corn now, his low yields would lower his income. Thus, the adoption of technology increases the income of all types of farmers. But an increase in the income is not uniform.

#### **4.4.5 Promotes Marketable Surplus**

Use of improved inputs in agriculture transformed agriculture from the subsistence level to profitable farm business level. The adoption of new technology increases not only the production but also the marketable surplus. And this is necessary for the growth of the economy. A. S. Kahlon<sup>14</sup> states that, "the recent technological breakthrough in agricultural production through seed, fertilizer and revolution has accelerated the transformation of the Indian farm economy from subsistence level to a profitable agri-business with rapid diffusion of new technology. The proportion of marketable surplus rapidly increased in these areas, where Wheat revolution was established. So that, the adoption of improved inputs in agriculture creates marketable surplus in the economy.

#### **4.4.6 Increase the consumption expenditure of the farmers**

The adoption of technology in agriculture increases the farm output and farmer's income. The increase in the purchasing power of the farmers increases the consumption expenditure. D. R. Arora, V. K. Agrawal and A. K. Gupta<sup>15</sup> after studying the benefits of "Green Revolution" and social change concluded that, "the benefits of Green Revolution were reaped by all sections of the society. Farmers have spent their increased income on improving their quality of life. Food habits and clothing pattern have also undergone changes in rural Punjab." People have become more conscious of balanced nutritious diet.

#### **4.4.7 Leads to changes in cropping pattern**

The technological progress brings changes in the cropping pattern. The traditional varieties of crops have been substituted by HYVP seeds. The traditional crop cycle and farm practices change the farmers go in favour of high value crops rather than the low value crops. The technological change pre-supposes assured irrigation facilities. Thus the cropping intensity is increasing.

#### **4.4.8 Promotes the changes in rural economy**

The technological progress in agriculture brings changes in the socio-economic and cultural life of the rural people. Improvement in rural education, health, life style etc. are related to technological change. Further, the technological progress in agriculture can become a means for the development of the rural economy.

#### **4.5 USE OF MACHINERY AND IMPLEMENTS**

In Maharashtra, the farmers use modern agricultural implements in their farm activities. At the same time some farmers in Maharashtra state also use the primitive methods and implements in agriculture for dry land cultivation. In most of the irrigated areas farmers are making use of modern agricultural machinery and- implements such as steel-ploughs, seed drill, sprayers, threshers, chaff cutters, electric pumpsets, tractors etc. Table No. 4.1 shows the use of agricultural machinery and implements in the state agriculture.

Table No. 4.1 indicates the use of agricultural machinery and implements in Maharashtra state during the reform period, 1990-91 to 2003-04. It is clear from the table that, in 1992 Census of agricultural implements, wooden ploughs were 32.04 per cent out of the total agriculture implements. It has decreased to 25.09 per cent in the year 1997. There is a decreasing trend by 38.76 per cent in 1997 Census over the base year 1992 Census. On the other hand in 1992 Census period, there were 14.08 per cent of steel ploughs but they have also decreased to 11.07 per cent in 1997 Census. So it indicates that, the use of wooden and steel ploughs is less important for their farm activities. Further in 1992 Census seed drills were 12.58 per cent but they have increased to 14.28 per cent in 1997 Census. The use of seed drill has increased by 4.20 per cent in 1997 Census over the base year 1992 Census. In 1992 sprayers and dusters accounts for 8.65 per cent but they have increased to 12.04 per cent in 1997 Census period. It indicates a significant increase by 21.88 per cent in the use of sprayers and dusters in Maharashtra state.

**Table No. 4.1**

**Use of Machinery and Implements in Maharashtra**

<b>Sr. No.</b>		<b>1992</b>	<b>1997</b>	<b>Change</b>	<b>Growth %</b>
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>
1.	Plough				
	a) Wooden	2187909 (32.04)	1576731 (25.09)	- 611178	-38.76
	b) Steel	961411 (14.08)	695962 (11.07)	-265449	-37.14
2.	Seed Drills	859547 (12.58)	897310 (14.28)	37763	4.20
3.	Sprayers and Dusters	591195 (8.65)	756797 (12.04)	165602	21.88
4.	Threshers	80549 (1.17)	57021 (0.90)	-23528	-41.26
5.	Chaff Cutters	48530 (0.71)	60268 (0.95)	11738	19.47

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>
6.	Bullock Cart	1138757 (16.67)	1182000 (18.81)	43243	3.65
7.	Sugarcane Crusher	8832 (0.12)	10374 (0.16)	1542	14.86
8.	Oil Engine with Pump	104722 (1.53)	112259 (1.78)	7537	6.71
9.	Electric Pumps	754636 (11.05)	851824 (13.56)	97188	11.40
10.	Tractors	91955 (1.34)	81353 (1.29)	-10602	-13.03
11.	Total	6828043 (100)	6281899 (100)	-546144	-8.69

Source : Crop and Season Report in Maharashtra 1999 and 2003.

Note : The data in parenthesis indicate percentage of total.

Further, in 1992 the use of threshers was 1.17 per cent, but they have decreased to 0.90 per cent in 1997 Census. It shows the insignificant decrease by 41.26 per cent in 1997 Census over the base year 1992 Census. In 1992 Census, chaff cutters accounted for 0.71 per cent but they have increased to 0.95 per cent in 1997 in 1997 Census. It indicates the increasing use of chaff cutters which is 19.47 per cent in 1997 Census over the base year 1992 Census. Similarly, the bullock carts accounts for 16.67 per cent in 1992 Census but they have increased to 18.81 per cent in T997 Census. This increase accounts for 3.65 per cent in 1997 over the base year 1992 Census. Further the sugarcane crusher accounts for 0.12 per cent in 1992 Census, it has increased to 0.16 per cent in 1997 Census. The overall increasing 14.86 per cent in 1997 Census over the base year 1992 Census it indicates that the importance of sugarcane crushers has been increased in agriculture. Moreover, the oil engine with pumps accounts for 1.53 per cent in 1992 Census, it has increased to 1.78 per cent in 1997 Census- This increase accounts for 6.71 per cent in 1997 Census over the base year 1992 Census- It indicates that the use of oil engine with pumps in agriculture has becoming more important. Similarly the electric pumpsets accounts for 11.05 per cent in 1992, but it has increased to 13.56 per cent in 1997 Census. There is a 11.40 per cent increase in use of electric pumps in the state during the period under study. It indicates that the importance of electric pumpsets is increasing in the field of agriculture. Moreover, tractors accounts for 1.34 per cent in 1992 Census, but it has decreased to 1.29 per cent in 1997. It indicates that the importance of tractors has been decreasing in the agriculture field.

Thus, from the analysis it is observed that the importance of primitive and traditional agricultural implements has been decreasing rapidly and the popularity of modern agricultural implements and machinery is increasing very rapidly. Mr. Anwar Alam<sup>16</sup> stated that, "agricultural mechanization is required to provide engineering inputs to agriculture, agro processing and rural living for increased production, provide technology for efficient handling transport and storage of agricultural produce, processed products and

by-products apply technology and management practices for value added agro processing industries that generate additional income and employment, assuring better quality of life to rural people, a life that is nutritionally healthy and hygienic, well secured and free from arduous labour and drudgery." Thus, the basic purpose of mechanization is to raise agricultural productivity, increase profitability in agriculture and thus improve the quality of life of the farming population. So to achieve the above purpose the farmers in Maharashtra state are becoming more conscious in the use of modern implements.

#### **4.6 USE OF HYVP SEEDS**

High Yielding Varieties seeds (HYVP) were introduced in Maharashtra since Green Revolution. Since then production and use of HYVP seeds related to Jowar, Bajara, Wheat, Paddy, Maize etc. have increased at a faster rate. The area under HYVP seeds has increased by 19.57 per cent in 2000-03 over the base year 1990-93. In 1990-93 the total area under HYVP seeds was 74.67 lakh hectares, which has increased to 89.29 lakh hectares in 2000-03. It indicates that, the farmers are using the HYVP seeds for their crop production. During the period under study, we observed an increase in area under HYVP seeds slowly. The total areas under HYVP seeds in Maharashtra state is depicted in Table No. 4.2. The area under paddy (HYVP) seeds shows a significant increase by 17.42 per cent in 2000-03 over the base year 1990-93. The area under paddy (HYVP) is 12.45 lakh hectares in 1990-93 which has increased to 14.62 lakh hectares in 2000-03. The percentage share of paddy is 16.68 per cent in 1990-93 which has increased to 18.38 per cent in 2000-03. This increase is mainly due to increase in area under irrigation in the state during the period under study.

**Table No. 4.2**  
**Coverage Under Hybrid and High Yielding Varieties in Maharashtra**

(Unit in Lakh Hectares)

Sr. No.		1990-93	1995-98	2000-03	Change	Growth %
1.	Paddy (HYV)	12.45 (16.68)	12.91 (15.86)	14.62 (18.38)	2.17	17.42
2.	Jowar (HYV)	39.33 (52.68)	43.07 (52.91)	48.32 (54.11)	8.98	6.05
3.	Bajata (HYV)	15.84 (21.21)	16.42 (20.17)	16.80 (18.81)	0.96	6.05
4.	Maize (HYV)	1.28 (1.70)	2.24 (2.75)	2.45 (2.74)	1.16	90.41
5.	Wheat (HYV)	5.74 (7.69)	6.74 (8.28)	7.09 (7.94)	1.34	23.37
6.	Grand Total	74.67 (100)	81.40 (100)	89.29 (100)	14.62	19.57

Statistical Handbook of Maharashtra - 1990-91 to 2003.

Note : The Data in parenthesis indicate percentage of total.

The area under Jowar (HYV) also shows a significant increasing trend by 22.83 per cent in 2000-03 over the base year 1990-93. The area under HYVP seeds of Jowar was 39.33 lakh hectares in 1990-93 which has increased to 48.32 lakh hectares in 2000-03. The percentage share of Jowar (HYV) is 52.68 per cent in 1990-93 which has increased to 54.11 per cent in 2000-03. It indicates that more than half of the area under Jowar (HYV) in the total area under HYVP seeds in the state.

The area under Bajara (HY) shows unsatisfactory increase in its area. In 1990-93 the area under Bajara (HY) was 15.84 lakh hectares which was a smaller increase by 16.80 lakh hectares in 2000-03. The percentage share of area under Bajara is 21.21 per cent in 1990-93 which has decreased to 18.81 per cent in 2000-03. The overall area under Bajara increased by only 6.05 per cent of the total area under HYVP seeds in Maharashtra state during the period under study.

Maize (HY) shows an increasing trend in its area. The area under maize (HY) was 1.28 lakh hectares in 1990-93 which has increased to 2.45 lakh hectares in 2000-03. The percentage share of area under Maize (HY) was 1.72 per cent in 1990-93 which has increased to 2.74 per cent in 2000-03. The overall area under Maize (HY) has increased by 90.41 per cent of the total area under HYVP seeds in the state during the period under study.

The area under Wheat (HYV) also shows a significant increasing trend by 23.37 per cent during the period under study. The area under Wheat (HYV) was 5.74 lakh hectares in 1990-93 which has increased to 7.09 lakh hectares in 2000-03. The percentage share of area under Wheat (HYV) was 7.69 per cent in 1990-93 which has increased to 7.94 per cent in 2000-03.

Thus, the overall area under HYVP seeds in the state shows an increasing trend by 19.57 per cent in 2000-03 over the base year 1990-93. The area under HYVP seeds was 74.67 lakh hectares in 1990-93 which has increased to 89.29 lakh hectares in 2000-03. It indicates that the farmers were using HYVP seeds for the purpose of efficient production during the period under study.

#### **4.7 USE OF CHEMICAL FERTILIZERS**

The use of chemical fertilizer in recent years has changed the prospects of agriculture in Maharashtra state. This is obviously because of yielding varieties, which are widely used for more responsive to fertilizers. Though fertilizers was used even before by the farmers but was restricted, to plantation crops only. Under Five Year Plans, efforts are being made to popularise the use of fertilizer. But, the consumption remained at a low level during the First and Second Five Year Plans. Only after 1960-61, the consumption of fertilizer increased considerably.

Table No. 4.3 shows the consumption of chemical fertilizer in Maharashtra state during the period under study. The use of chemical fertilizer (N+P-hK) in 1990-93 was 2392 metric tonries, which has increased to 14151.3 metric tonnes in 2001-04. It indicates that the farmers have used heavy dose of chemical fertilizer for the increasing their production. The overall use of chemical fertilizers has increased to 1759 metric tonnes in 2001-04 over the base year 1990-93.

The consumption of Nitrogenous (N) shows a decreasing trend by 8.42 per cent in 2001-04 over the base year 1990-93. The consumption of Nitrogenous in 1990-93 was 7415.3 metric tonnes, which has decreased to 6839.3 metric tonnes in 2001-04. The percentage share of the total consumption of chemical fertilizer has 59.83 per cent in 1990-93, which has decreased to 38.64 per cent in 2001-04. This indicates that the use of Nitrogenous fertilizer in agriculture has been becoming least significant.

The consumption of Phosphatic (P) shows an increasing trend by 33.55 per cent during the period under study. It was 3,263.7 metric tonnes in 1990-93 which has increased to 4,912 metric tonnes in 2001-04. The percentage share of Phosphatic fertilizer was 26.33 per cent in 1990-93, which has increased to 27.75 per cent in 2001-04. This indicates the magnitude of the use of phosphatic fertilizer in the state agriculture, which is becoming significant during the study period.

**Table No. 4.3**  
**Use of Chemical Fertilizer in Maharashtra**

(00' Metric Tonnes)

<b>Sr. No.</b>	<b>Fertilizers</b>	<b>1990-93</b>	<b>1995-98</b>	<b>2000-03</b>	<b>Change</b>	<b>Growth</b>
1.	Nitrogeneous	7415.3	9193.3	6839.3	-576	-8.42
2.	Phosphatic	3263.7	3545.7	4912	1648	33.55
3.	Potassic	1713.3	1620.0	2400	686	28.61

Source : Statistical Handbook of Maharashtra 1990-91 to 2003-04.

**Table No. 4.4**  
**Yearwise Consumption of Chemical Fertilizers**

<b>Year</b>	<b>Total Consumption (Lakh MT)</b>	<b>Per Hectare Consumption (Kg)</b>
2005-06	42.6	97.5
2006-07	48.2	400.2
2007-08	47.9	109.7
2008-09	52.5	133.0
2009-10	60.9	153.4
2010-11	70.3	163.8

Source - Economic Survey of Maharashtra, 2011-12.

The consumption of Potassic (K) fertilizer shows a significant increasing by 28.61 per cent in 2001-04 over the base year 1990-93. The consumption of Potassic fertilizer in 1990-93 was 1,713.3 metric tonnes which has increased to 2,400 metric tonnes in 2001-04. The percentage share of the total consumption of chemical fertilizers in the state was 13.82 per cent in 1990-93 which has decreased to 13.56 per cent in 2001-04. An increasing use of Potassic fertilizer was 686 metric tonnes during the period under study.

Thus, the consumption of chemical fertilizer in the state has increased to 1,759 metric tonnes in 2001-04 over the base year 1990-93. It indicates that the use of chemical fertilizer in state agriculture is increasing very slowly.

#### **4.8 CONCLUSIONS**

The broad conclusions that emerge out of this study of changes in adoption of a new agricultural technologies in Maharashtra state during period under study reflects the fact that, the use of wooden and steel ploughs shows a decreasing trend by 76.90 per cent in 1997 Census over the base year 1992 Census. It is observed that the use of seed drill increased by 4.20 per cent in 1997 Census over the base year 1992 Census. The use of sprayers and dusters shows a significant increasing trend by 21.88 per cent during period under study. Further the use of theaters was found at 1.17 per cent in 1992 but has decreased to 0.90 per cent in 1997. It shows an insignificant decrease by 41.26 per cent in 1997 Census over the base year 1992 Census. The use of chaff cutters shows an increasing trend by 19.47 per cent in 1997 Census over the base year 1992 Census. The use of bullock carts has increased by 3.65 per cent. The sugarcane crusher accounts for 0.12 per cent in 1992 Census, it has increased to 0.16 per cent in 1997 Census. The overall increase of 14.86 per cent in 1997 over the base year 1992 Census. The use of oil engine with pumps shows an increasing trend by 6.71 per cent in 1997 Census over the base year 1992 Census. [The use of electrical pumpsets during the period under study; Moreover, tractors accounts for 1.34 per cent in 1992 Census, but it has decreased to 1.29 per cent in 1997 Census.

The area under High Yielding Varieties of seeds has increased by 19.57 per cent in 2000-03 over the base year 1990-93. The area under paddy (HYVP) seeds shows a significant increase by 17.42 per cent during the period under study.

The area under Jowar (HYV) also shows a significant increase by 22.83 per cent in ,2000-03. The area under Bajara (HY) shows a smaller increase by 6.05 per cent during the period under study. Maize (HY) shows an increasing trend by 90.41 per cent of the total area under HYVP seeds in the state during the period under study. The area under Wheat (HYV) also shows a significant increase trend by 23.37 per cent during the period understudy.

Consumption of chemical fertilizer (N+P+K) in Maharashtra was 12,392 metric tonnes in 1990-93, which has increased to 14,151.3 metric tonnes in 2001-04. The consumption of Nitrogenous (N) chemical fertilizer shows a decreasing trend by 8.42 per cent in 2001-04 over the base year 1990-93. The consumption of Phosphatic (P) chemical fertilizer shows an increasing trend by 33.55 per cent during the period under study. The consumption of Potassic (K) fertilizer shows significantly increasing trend by 28.61 per cent in 2001-04 over the base year 1990-93.

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## **CHAPTER - V**

### **AGRICULTURAL PRODUCTIVITY DURING THE REFORM PERIOD**

#### **5.1 INTRODUCTION**

The agricultural produce includes Cereals, Pulses, Oilseeds, Sugar, drugs, narcotics. Fibers, Fruits and Vegetable and Fodder. However, we are considered only production of principal crops in Maharashtra divided in two categories.

- 1) Total foodgrains
- 2) Total cashcrops

In category of foodgrain. Cereals and Pulses are included. Total Cereals includes Rice, Wheat, Jowar, Bajara and other Cereals and the Pulse includes Gram, Tur and other pulses. The second category is cash crops which includes. Groundnut, Cotton, Sugarcane, Tobacco. Overall production of foodgrains has decreased by 11.27 per cent during the period under study. In 1990-93 production of foodgrain was 1,15,297 hundred tonnes which has decreased to 1,02,302 hundred tonnes in 2001-04. It reached to its maximum of 1,19,721 hundred tonnes in 1995-98.

Among the agricultural commodities produced, the percentage share of Cereals in 1990-93 was 87.84, which has decreased to 81.94 per cent in 2001-04. However, this group of Cereals has shown insignificant decrease of 17.23 per cent in 2001-04 over the base year 1990-93. The percentage share of Pulses in 2001-04 is 18.05 per cent of the total foodgrain production. This shows a rising trend of 31.75 per cent during the period under study. In 1990-93 production of Pulses was 14,019 hundred tonnes, which has increased to 18,470 hundred tonnes in 2001-04.

The second group of cashcrops shows a rising trend during the period under study. Overall production of cashcrops has increased by 2.76 per cent in 2001-04 over the base year 1990-93. In 1990-93 production of cashcrops was 3,62,023 hundred tonnes, which has increased to 3,71,945 hundred tonnes in 2001-04. Groundnut and Tobacco are the only two crops, which shows a decreasing trend in overall production of cashcrops. In 1990-93 the production of Tobacco was 101 hundred tonnes, which has decreased to 68 hundred tonnes in 2001-04. Overall production of Tobacco has decreased by 32.17 per cent in 2001-04 over the base year 1990-93. Groundnut shows a decline trend in its production during the period under study. In 1990-93 production of Groundnut was 7,656 hundred tonnes, which has decreased to 4,447 hundred tonnes in 2001-04. Overall decrease in production of Groundnut was 4.92 per cent in 2001-04 over the base year 1990-93.

Thus, the foodgrain production shows a declining trend during the period under study and in the second category cashcrops shows an increasing trend in production of cashcrops.

## **5.2 PRODUCTIVITY OF TOTAL CEREALS**

The trend in production of Cereals can be studied from Table No. 5.1. During the period under study, the Cereal's production had been continuously declined after 1997-98. Production of Cereals show a declining trend in its production during the period under study. In 1990-93 production of Cereals accounting for 1,01,278 hundred tonnes, which has decreased to 83,831 hundred tonnes in 2001-04. Overall decrease in production of Cereals is 17.23 per cent in 2001-04 over the base year in 1990-93. Among this group. Cereal's contribution of-Jowar is important. Jowar contributes about 40 per cent decrease in the total foodgrains production and Bajara contributes about 27.97 per cent decrease in total production of foodgrain as a result. Cereals shows a declining trend in its production during the period under study.

**1) Rice :**

Among the food crops, Rice is one of the important crop next to Jowar in Maharashtra. The average production of Rice accounts for about 24.20 per cent of the total foodgrain's production in the state. In 1990-93, the production of Rice was 22,589 hundred tonnes, which has increased to 24,762 hundred tonnes in 2001-04. It had reached to its maximum to 25,239 hundred tonnes in 1995-98. During this year wide spread rains were received practically in times of rainy seasons the rain occurred in most parts of the state. Overall increase the production of Rice is 9.62 per cent in 2001 -04 over the base year 1990-93.

**Table No. 5.1****Production of Principal Crops in Maharashtra**

[Triennial Average Production in '00' Tonnes]

<b>Sr. No.</b>	<b>Crops</b>	<b>1990-93</b>	<b>1995-98</b>	<b>2001-04</b>	<b>2010-11</b>	<b>Growth %</b>
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
1.	Rice	22589 (19.59)	25239 (21.08)	24762 (24.20)	23900	5.80
2.	Wheat	7806 (6.77)	9117 (7.61)	8405 (8.21)	18520	137.25
3.	Jowar	53419 (46.33)	50009 (41.77)	32810 (32.07)	34560	- 35.30
4.	Bjara	12639 (10.96)	13052 (10.90)	9103 (8.89)	8500	- 32.74
5.	Other Cereals	4787 (4.15)	6007 (5.01)	8749 (8.55)	21380	346.62
6.	Total Cereals	101278 (87.84)	103425 (86.38)	83831 (81.94)	106870	5.52
7.	Gram	2884 (2.50)	3884 (3.24)	4212 (4.11)	10620	268.23
8.	Tur	4568 (3.96)	5620 (4.69)	7252 (7.08)	8330	82.35
9.	Other Pulses	6566 (5.69)	6791 (5.67)	7006 (6.84)	4800	- 26.89
10.	Total Pulses	14019 (12.15)	16296 (13.61)	18470 (18.05)	23760	69.48

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
11.	Total Foodgrains	115297 (100.00)	119721 (100.00)	102302 (100.00)	130640	13.30
12.	Groundnut	7656 (2.11)	6537 (1.50)	4447 (1.19)	3910	- 48.92
13.	Cotton	2744 (0.75)	4361 (1.00)	3640 (0.97)	57780	2005.68
14.	Sugarcane	351521 (97.09)	422117 (97.45)	363788 (97.80)	701660	99.60
15.	Tobacco	101 (0.02)	126 (0.02)	68 (0.01)	70	- 30.69
16.	Total Cashcrops	362023 (100.00)	433143 (100.00)	371945 (100.00)	---	N.A.

Source : Economic Survey of Maharashtra (1990-91 to 2003-04)

Note : The Data in Parenthesis indicate percentage of total.

Ample evidence is now available within and outside the country about the superior yield response of a new Rice variety compared to the traditional tall varieties at all levels of fertilization within dry and wet seasons. Compared to the tall varieties, the new varieties due to their ability to utilize nitrogen more efficiently, give nearly twice as many kilograms of grains for each kg. of nitrogen applied even at moderate level of nitrogen. This the per hectare production of Rice in 1990-91 was 1467 kg, which has increased to 1849 kg in 2003-04. The straw production also runs almost parallel to grain production in these high yielding varieties.

Rice is the most responsive and productive crop. Similarly, Rice cultivation is labour intensive and efforts to increase it where water is available by wells, tanks and canals as well as under the new command areas would positively ensure higher level of manpower utilization for a longer period with substantial increase in Rice production.

## **2) Wheat :**

The production of Wheat shows a rise during the period under study. In 1990-93 production of Wheat was 7,806 hundred tonnes, which has increased to 8,405 hundred tonnes in 2001-04. Overall production of Wheat increased by 7.66 per cent in 2001-04 over the base year 1990-93. The per hectare production of Wheat in 1990-91 was 1,049 kg, which has increased to 1,171 kg in 2001-04. During the year 1995-96 the per hectare production of Wheat was highest to 1,270 kg per hectare. The production from irrigated area is greater than rainfed area. The main reason for low yield of Wheat especially in rainfall area are a short and mid winter season, raising the crop on receding moisture adversely affects atmospheric drought attack of white ants and white grubs, use of local varieties, limited use of fertilizers, lack of clean cultivation and small holdings with meagre credit facilities.

### **3) Jowar :**

The contribution of Jowar to the total foodgrains production is also to the tune of 42-45 per cent. Jowar is grown in both seasons. The contribution of rabi Jowar is nearly 30 per cent while the contribution of kharif Jowar to the production was nearly 15 per cent of the total foodgrain's production.

Jowar's production shows a declining trend during the period under study. In 1990-93, production of Jowar was 53,419 hundred tonnes, it has decreased to 32,810 hundred tonnes in 2001-04. Production of Jowar has continuously declined from 1995-96 to end of period under study. Overall production of Jowar decreased by 38.58 per cent in 2001 over the base year 1990-93. The per hectare production of Jowar in 1990-91 was 941 kg, which has decreased to 651 kg per hectare in 2003-04. This decrease was mainly due to the unfavourable weather conditions in the state and limited use of fertilizers, lack of cultivation and small holdings with meagre credit facilities.

### **4) Bajara :**

Bajara is an important food crop in the state. Production of Bajara shows a declining trend during the period under study. Overall production of Bajara has decreased by 27.97 per cent in the total foodgrain's production in 2001-04 over the base year 1990-93. In 1990-93 production of Bajara was 12,639 hundred tonnes, which has decreased to 9,103 hundred tonnes in 2001-04. Thus the per hectare production of Bajara in 1990-91 was 11,149 kg, which has decreased to 8,963 kg per hectare in 2003-04. The low per hectare yield of this crop was due to its cultivation and marginal lands under erratic rainfall conditions. In some ergot incidence was also heavy, which reduced the yields considerably. So far ergot resistant varieties are not available. This is the main reason to decrease the area as well as production of Bajara. Therefore, more stress will have to be given to early sowing in order to avoid ergot attack.

### **5) Other Cereals :**

Other Cereals include Maize, Ragi, Warai, Rala etc. The production of other Cereals in the state during the period under study shows a significant rise. In 1990-93 production of other Cereals was 4,787 hundred tonnes, which has increased to 8,749 hundred tonnes or 8.55 per cent of the total production of foodgrains in 2001-04. This increase came to 82.75 per cent in 2001 -04 over the base year 1990-93.

An increase in production of other Cereals was mainly from the contribution of Maize in production. This increase was mainly due to the cultivation of High Yielding varieties as well as its multiple uses. Maize can be used as green fodder and it is grown mix as crop with different crops. Increase in Maize production is also due to increase in irrigation facilities in the state.

Ragi is a minor Cereal used as food grain in the state. It is grown in kharif season in rainfall areas. Ragi give the important contribution to increase in production of other Cereals.

### **5.3 PRODUCTIVITY OF TOTAL PULSES**

The performance of Pulses in the state shows a significant increasing trend in its production during the period under study. As a result the state become self sufficient in meeting the internal demand for Pulses.

Gram, Tur, Moong are the major Pulses grown in most part of the state. The production of Pulses has increased by 31.75 per cent of the total foodgrain production in 2001-04 over the base year 1990-93. In 1990-93 production of Pulses was 14,019 hundred tonnes, which has increased to 18470 hundred tonnes in 2001-04. The per hectare production of Pulses in 1990-91 was 442 kg, which has increased to 569 kg per hectare in 2003-04.

Gram is the most important Pulses in the state. Production of Gram shows an increasing trend by 46.04 per cent in 2001-04 over the base year 1990-93. The production of Tur shows a significant increasing trend during the period under study. In 1990-93 production of Tur was 4,568 hundred

tonnes or 3.96 per cent, which has increased to 7,252 hundred tonnes or 7.08 per cent in 2001-04. Overall production of Tur has increased by 58.73 per cent in 2001-04 over the base year 1990-93.

The other Pulses also shows an increasing trend in its production. In 1990-93 production of other Pulses was 6,566 hundred tonnes or 5.69 per cent, which has increased to 7006 hundred tonnes or 6.84 per cent in 2001-04. The production of other Pulses has increased by 6.70 per cent in 2001-04 over the base year 1990-93. Amongst the various kharif. Pulses occupy a major share both in terms of area and production and they are also grown as mixed as well as pure crops.

**1) Gram :**

Gram is the most important Pulses in the state. It is the only Pulses crop grown in rabbi season. It is cultivated both in irrigated and rainfed conditions. The production of Gram shows a significant increasing trend during the period under study. In 1990-93 production of Gram was 2884 hundred tonnes or 2.50 per cent, which has increased to 4,212 hundred tonnes or 4.11 per cent in 2001-04. Overall increase in production of Gram is 46.04 per cent in 2001-04 over the base year 1990-93. The per hectare production of Gram was 526 kg in 1995-96, which has increased to 530 kg per hectare in 2003-04. This increase was mainly due to the increase in irrigation facilities in the state during the period under study.

**2) Tur :**

Tur is important Pulses crop next -to Gram in the state The production of Tur shows an increasing trend during the period under study. In the year 1990-93 the production of Tur was 4,568 hundred tonnes. This has increased to 7,252 hundred tonnes in 2001-04. The production of Tur has increased by 58.73 per cent in 2001-04 over the base year 1990-93. The per hectare production of Tur in 1990-91 was 417 kg, which has increased in 2003-04 to 602 kg per hectare. This increase shows the farmers' attitudinal change towards the production of Pulses and broadly say that, farmers have to

demand for their production. So, they concentrate on market for the purpose of crops choices.

### **3) Other Pulses :**

Other pulses includes Urid, Moong etc. production of other Pulses shows an increasing trend during the period under study. In 1990-93, production of other Pulses was 6,566 hundred tonnes or 5.69 per cent, which has increased to 7,006 hundred tonnes or 6.84 per cent in 2001-04. The production of other Pulses has increased by 6.70 per cent in 2001-04 over the base year 1990-93.. This increase was mainly due to increase in the area under other Pulses and increase in irrigation facilities in the state during the period under study as a result increase in production of other Pulses.

## **5.4 PRODUCTIVITY OF CASHCROPS**

In the categories of cashcrops. Groundnut, Cotton, Sugarcane and Tobacco are included. The production of cash crops shows an increasing trend by 2.76 per cent during the period under study. In 1990-93 production of cash crops was 3,62,023 hundred tonnes, which has increased to 3,71,945 hundred tonnes in 2001-04.

### **1) Groundnut**

Groundnut is an important Oil seed crop in the state. It is a cheapest source of Vegetable oil and fats for the common persons. The per yield in 1990-91 was 1,132 kg, which has decreased to 958 kg per hectare in 2000-01. Again it has increased to 11,612 kg per hectare in 2003-04. The production of Groundnut shows a negative growth by 41.92 per cent in 2001-04 over the base year 1990-93. In 1990-93, total production was 7,656 hundred tonnes, it has decreased to 4,447 hundred tonnes in 2001-04. The overall decrease in the production of Groundnut was 3,209 hundred tonnes in 2001-04 over the base year 1990-93.

The decline in the output was the result of partly area contraction and partly yield depreciation. So, with regard to output, sometimes it's yield that exerted the influence on the output and still some other times are both the area

and yield that exerted the influence on the output. For getting maximum per hectare yield, it is essential to ensure the non-cash inputs like, timely sowing, optimum plant population in addition to cash inputs like fertilizers especially phosphate, lastly use of bacterial cultures were promising.

## **2) Cotton :**

Cotton is the most important fiber crops in the state. The production of Cotton shows a positive growth by 32.66 per cent in 2001-04 over the base year 1990-93. In 1990-93 production of cotton was 2,744 hundred tonnes, which has increased to 3,640 hundred tonnes in 2001-04. The per hectare production of Cotton in 1990-91 was 117 kg., which has increased to 190 kg per hectare in 2003-04. Thus, Cotton is the main fiber crops in the state as a result develop the Cotton industry in the state. This increase was mainly due to the favourable wheather conditions in the state and increase in area under cotton.

## **3) Sugarcane :**

Sugarcane occupies a pride of place in the agricultural economy of the state as it is one of important commercial crops. The sugar industry is the second largest industries in the country. The state's sugar industry in the country contribute to 34.4 per cent share. Maharashtra contribute 30.9 per cent sugar production of the total sugar production in India.

The production of sugarcane shows an increasing trend during the period under study. The production of Sugarcane in 1990-93 was 3,51,521 hundred tonnes, which has increased to 3,63,788 hundred tonnes in 2001-04. There is an increase of 3.48 per cent in 2001-04 over the base year 1990-93. The per hectare production of Sugarcane was 86,400 kg in 1990-91, which has decreased to 51,315 kg per hectare in 2003-04. This decrease was mainly due to disease and lack of credit facilities, excess use of water limited use of fertilizers and small holdings etc.

The general standard of cultivation and after care is much better in the south and north India resulting in higher tonnes and better recovery. Maharashtra stands first in recovery of sugar. The state ranks fourth in the

country in total sugar production and in average yield per hectare. Based on the latest statistic nearly 80 per cent Sugarcane produced in Maharashtra is utilized for sugar manufacture and the remaining 20 per cent of cane is used for gur production.

The potential canal irrigation is utilized by this crop. Nearly 30 per cent of the area under Sugarcane receives canal irrigation and rest of 70 per cent has to depend on irrigation either on wells, lifts and other sources.

#### **4) Tobacco :**

Tobacco shows a declining trend in its production during the period under study. The production of Tobacco was 101 hundred tonnes in 1990-93, which has decreased to 68 hundred tonnes in 2001-04. The overall decline in the production of Tobacco by 32.12 per cent in 2001-04. Over the base year 1990-93. The per hectare production of Tobacco was 10.39 kg in 1990-91, which has decreased to 958 kg per hectare in 2000-01. Again, it has increased to 1,162 kg per hectare in 2003-04. This decrease was mainly due to decrease in area under Tobacco. Thus, the production of Tobacco shows a declining trend during the period under study.

## **5.5 CONCLUSIONS**

The broad conclusions that emerge out of this study of agricultural growth during economic reform period (1990-91 to 2003-04) in Maharashtra state are summarized as follows -

Over all agricultural production of foodgrain during the period of study shows a declining trend. It was 1,15,297 hundred tonnes in 1990-93, which has decreased to 1,02,302 hundred tonnes in 2001-04, This decrease comes to a 11.27 per cent during the period under study, which seems to be a negative growth.

Production of Cereals has decreased from 1,01,278 hundred tonnes to 83,331 hundred tonnes in 2001-04. This decrease comes to a 17.23 per cent during the period under study which seem to be a negative growth.

The production of Rice shows a rising trend from 22,589 hundred tonnes in 1990-93 to 24,762 hundred tonnes in 2001-04. There is overall increase by 9.62 per cent during the period under study. The share of Rice in total foodgrain production in 1990-93 was 19.59 per cent, which has increased to 24.20 per cent in 2001-04.

Wheat production in Maharashtra shows a rising trend by 7.66 per cent in 2001-04 over the base year 1990-93. In total foodgrain production, the share of Wheat has increased from 6.77 per cent in 1990-93 to 8.21 per cent in 2001-04:1

Jowar production reflects decrease of 38.58 per cent in 2001-04 over the base year 1990-93. The production of Jowar in 1990-93 was 53419 hundred tonnes with its share of 46.33 per cent in total foodgrain production. This has decreased to 32.67 per cent in 2001-04 with its production of 32,810 hundred tonnes.

Bajara production also shows a declining trend during the period under study. In 1990-93 production of Bajara was 12,639 hundred tonnes, which has decreased to 9,103 hundred tonnes in 2001-04. This decrease comes to 27.97 per cent in 2001-04 over the base year 1990-93 J The share of Bajara in total foodgrain production in 1990-93 was 10.96 per cent, which has decreased to 8.89 per cent in 2001-04.

Production of other Cereals including Maize, Ragi etc. shows a noticeable rise of 82.75 per cent in 2001-04 over the base year 1990-93. The production of other Cereals in 1990-93 was 4,787 hundred tonnes with its share of 4.15 per cent in the total foodgrain production. This has increased to 8.55 per cent in 2001-04 with its production value of 8,749 hundred tonnes.

The total Pulses production in Maharashtra during the period under study has increased from 14,019 hundred tonnes in 1990-93 to 18470 hundred tonnes in 2001-04i The production of Pulses has increased from 31.75 per cent in 2001-04 over the base year 1990-93. The percentage share of Pulses in 1990-93 was 12.15, which has increased to 18.05 per cent in 2001-04.

The production of Gram has increased by 46.04 per cent in 2001-04 over the base year 1990-93. In 1990-93 production of Gram was 2,884 hundred tonnes with its share of 2.50 per cent in total foodgrain production, which has increased to 4.11 per cent in 2001-04 with its production of 4212 hundred tonnes.

The production of Tur has increased by 58.73 per cent in 2001-04 over the base year 1990-93. The production of Tur in 1990-93 was 4,568 hundred tonnes, which has increased to 7,252 hundred tonnes in 2001-04. The percentage share of Tur was 3.96 per cent in 1990-93, which has increased to 7.08 per cent in 2001-04.

The production of other Pulses (Moong, Masur, Urid etc.) has increased by 6.70 per cent in 2001-04 over the base year 1990-93. The production of other Pulses in 1990-93 was 6,566 hundred tonnes which has increased to 7006 hundred tonnes in 2001-04. The percentage share of other Pulses was 5.69 per cent in 1990-93, which has increased to 6.84 per cent in 2001-04.

The overall production of cashcrops (Groundnut, Cotton, Sugarcane, Tobacco) in Maharashtra during the period under study shows 2.76 per cent increase in 2001-04 over the base year 1990-93.

The Groundnut production shows a declining trend with 41.92 per cent during the period under study. The production of Groundnut in 1990-93 was 7,656 hundred tonnes with its share of 2.11 per cent in total cashcrops production, which has decreased to 1.19 per cent in 2001-04 with its production of 4,447 hundred tonnes.

Cotton production has increased by 32.66 per cent in 2001-04 over the base year of 1990-93. The Cotton production in 1990-93 was 2744 hundred tonnes with its share of 0.75 per cent in total cashcrops production, which has increased to 0.97 per cent in 2001-04 with its production of 3,640 hundred tonnes.

The overall Sugarcane production in Maharashtra has increased from 3.48 per cent in 2001-04 over the base year 1990-93. The production of

Sugarcane in 1990-93 3,51,521 hundred tonnes, which has increased to 3,63,788 hundred tonnes in 2001-04. This increase in Sugarcane production in the state is the largest sugar producing in the country.

Tobaccos share in production has declining trend of 32.12 per cent in 2001-04 over the base year 1990-93. The production of Tobacco was 101 hundred tonnes with its share of 0.02 per cent of the total production of cashcrops in 1990-93, which has decreased to 0.009 per cent in 2001-04 with its production of 68 hundred tonnes.

## CHAPTER - VI

# TRENDS IN AGRICULTURAL EXPORTS

### 6.1 INTRODUCTION

Export has been assigned a crucial role in the country's economic development. It is a well established fact that export need to be increased at a higher rate to achieve national self reliance and reduce the dependence on internal assistance. In this context, export promotion assumes greater importance.

Mr. C. N. Purshattaman Nair<sup>1</sup>, well known scholar observes that, "the export promotion in India is confronted with many problems. Most of the problems can be easily tackled internally, if we put earnest efforts in this direction. India has greater opportunities in export marketing. What is needed is an effective export culture with an inbuilt mechanism of export promotion. A shift is required to be made in country's exports from less processed to more processed and value added products. In order to generate higher foreign exchange earnings, more value addition is to be made in our exportable products."

The Government Export Policy has been described by Mr. Balgopal<sup>2</sup> as "the policies adopted were continuously refined to the conditions within, as well as. outside, the country. In 1966, rupee was devalued in an effort to make it more representative in the international market. During 1970s, 1980s, and 1990s, the export policy resolutions for the respective time frame were adopted to guide the export efforts. As a result of the various policy measures under taken by the Government, export have since undergone a substantial change in respect of value composition of products and direction of trade" The surplus is earned of late.

Generally, the major problems of agricultural export marketing rise from environmental differences created by geographical factors, cultural, political and economic conditions. These factors may be classified as

controllable factors which includes; the elements as product, price, promotion and distribution. These factors are mostly known as export marketing. The main element to operate is beyond the control of the company.

## **6.2 PRESENT POSITION OF AGRICULTURAL EXPORT**

The new economic reform in India coinciding with the WTO Agreement open up immense opportunities for Indian agriculture products to enter the global market. Even today, 60 to 65 per cent of the total labour force is dependent, on agriculture. This brings out that, the general standard of living of people can be raised only ensuring accelerated and diversified agricultural development. To facilitate this process, due importance should be given to globalizing the Indian agriculture in terms of policy measures.

In this context Devendra Thakur<sup>3</sup>, describes his views as "agricultural export help modernize production, post harvest processing and marketing system and advantages of most recent technological advancement in the network ^planning process. Needless to mention that, agricultural export planning has not been developed in a systematic manner. It is necessary to understand that, exports are possible if we are able to produce the items in a sustained manner of the desired quality along with well co-ordinated promotional efforts. Above all the Government will have to involve, initiate and implement export promotion policy in effective manner."

S. C. Nagpal and A. C. Mittal<sup>4</sup>, explains their observations regarding Indian agricultural export and economic development as, "the need for increasing export for augmenting foreign exchange earnings is very critical for India. Foreign exchange is vital for promoting overall economic development without sacrificing country's self-reliance. Export growth and economic development are thus inter related."

**Table No. 6.1**  
**Share of Agricultural Export in Total National Export**

Rs. in crores

Year	Export		% share of Agri. Export
	Total National	Agriculture	
1990-91	32527	6013	18.49
1995-96	106353	20398	19.18
2000-01	201356	28657	14.23
2001-02	209018	29729	14.22
2002-03	255137	34654	" 13.58
2003-04	291582	36894	12.65

Source : Agricultural Statistics at a Glance-20.04, Directorate of Economics and Statistics, Government of India, New Delhi.

In 1990-91, there was 18.49 per cent share of agricultural sector in total national export, whereas in 2003-04 it decreased to 12.65 per cent of agricultural exports is comparatively growing over the period under study. Due to growing share of other exports, the exports in relative terms have declined.

Further S. C. Nagpal and A. C. Mittal<sup>5</sup> accounts for the details about export opportunities as "agricultural export offer opportunities, which can change the entire economics of cultivation for the growers. The Fruit and Vegetables processing industry can be instituted only with export market outlets."

Table No. 6.1 shows that, the share of agricultural export in the total national export is declining.

### **6.3 HORTICULTURAL EXPORT**

Horticultural crops are high value crops. They respond a very well to the inputs resulting in high productivity. They are highly perishable in nature hence need to be stored well, handled carefully and transported quickly.

Dr. V. B. Jugule<sup>6</sup> states that, "the globalization process has motivated our farmers to think of the global demands. Based on it, the farm management techniques vis-a-vis cropping pattern are changing so as to spin the foreign exchanges. Horticultural products are being demanded by the foreign consumers. Consequently the farming is tending towards its growth and expansion in various states."

In terms of global trade, India's share in the agricultural export is significant while India contributes to the worlds 8 per cent, and 11.5 per cent Fruits and Vegetables production respectively. It's Share in global export of Fruit and Vegetable is less than one per cent.

#### **6.4 W.T.O. AND AGRICULTURAL EXPORT**

The W. T. O. agreements are a milestone in the development of the international trade in agriculture commodities. Agriculture has been brought under international discipline, which is of great significance on the part of the LDCs in general and India in particular. It is very difficult to foresee the exact outcome of the World Trade Organization (W.T.O.). There are complexities involved in various provisions. The challenge is left to the agriculturists to provide them an opportunity for making some heroic efforts to capture the world market. Traditionally, plantation and the fiber crops occupied prime position in the agricultural export of our country. Oil seeds occupied a dominant position in the imports.

Some horticulture commodities are becoming popular in foreign countries. For example, India is exporting Onion to more than 45 countries and major countries like UAE, Malasiya, Singapore, Sri-Lanka, Saudi Arabia, Bangladesh, Kuwait and Mauritius. Floricultural export is emerging industry in India. Export of Grapes from India has increased many folds ever since it started in 1991, but still faces the quality constrains. It is estimated that the market could go upto Rs. 23,000 crores within the next six to seven years. Government is looking for potential rise in Floricultured exports from India.

IDBI is examining on a case-by-case basis the Floriculture units rehabilitation package.

The WTO agreement in agriculture had entered the significant phase of negotiations in 2000-2001 as required by Article 20 of the Agreement. In the plantation sector, apart from AMS and tariffication of quantitative restrictions, plantation commodities have been faced with non-tariff walls imposed by the WTO Agreement on Sanitary and Phyto Sanitary measures.

The principal problems faced by the different sections of the floriculture industry arise from various situations. The WTO Agreement binds 100 per cent of agricultural products' tariff lines and requires developing and developed countries to bring down both bound and applied tariffs, the pattern of tariff cuts has not been specified. This has significant implication on the Floriculture industry.

Cut flower exports from India face a higher import duties in Europe (13%) during non-peak market (May-October). When flowers are required (i.e. during November-April) the tariff rates are lowered to 5 to 6 per cent. But the real tariff works out on FOB plus freight to 17 per cent. Due to higher tariff walls, the Indian flowers have to search out the domestic markets. India should be very particular in negotiating the scientific criteria for reduction in imports tariffs.

India has submitted to the WTO, a negative AMS. Plantation commodities are left out of AMS calculations. But these commodities be the subject to AMS in future. India has to situate bulk of domestic support extended to plantation commodities in the permissible "Green Box" category. Domestic support extended to Indian Coffee and Spices in Western Ghats and to Indian tea, large Cardamom and endemic Chillies in the North-East and Eastern Himalayas eminently qualify under regional development and environmental causes to be landed and locked up in the Green Box. The regional assistance schemes and environmental support schemes are exempted from the regimentation of the WTO Agreement on subsidies and countervailing measures.

The existing scope of sample analysis methods is narrow and do not suit to Indian Spice exporters. Notifications of new regulations are required to be made known to the exporters. Even the Codex Standards will not look into sample analysis, which is a strong inducement to utilize SPS standards as NTBs.

In the changing export marketing scenario, every industry is facing a high degree of economic pressure in export business, which today no longer depends on domestic market alone. "Export or perish" has now become a slogan" for furthering of export-business activities and at times offering the only solution to its. survival.

On the other hand, since 1993, the EU through its various technical directives has made use of a recognized quality standard which is an increasingly essential requirement for doing business with EU countries.

A well documented and efficiently implemented ISO 9000 quality management system (QMS) provides an exhibitiv opportunity to fulfill this requirement and through while not obligatory, becomes mandatory requirement for exporting in Europe. In other words, an exporter with ISO 9000 Certification has better chances of placing our products in the European market without such a Certification, some people view this as unilateral to free trade.

The quality system as documented and implemented must satisfy the requirements of the appropriate ISO 9000 standard. Involvement of the approved third party for certification is important.

## **6.5 MAJOR AGRICULTURAL EXPORT CONSIST OF HORTICULTURE PRODUCTS :**

The export of horticultural products are generally classified into number of categories e.g. Forest, Fruits, Fresh Vegetables, processed Fruits and Vegetables, dehydrated Fruits and Vegetables, dried Fruits and Vegetables, canned Fruits and Vegetables etc. We choose the major exporting Fruits and Vegetables in Maharashtra namely. Onion, Vegetables, Mango,

Grapes and Other Fruits for the purpose to analyze. Table No. 6.2 illustrates the export trend of Fruits and Vegetables from Maharashtra during the period from 1993-94 to 2002-03. Lot of statistical confusions are observed in the data tabulations, for example in Maharashtra state no plantation of Apple is seen, but Apple has been shown exported from Mumbai. It is very difficult to estimate statewise export data, "because me produce from other slate areas may possibly get exported from other states, if exporters belong to the exporting states.

However, the major horticultural export from Maharashtra state consists of Mango and its products. Grape, Strawberry, Banana, Cirtus, Oranges, dried Fruits and Vegetables, Onion, Cut flowers, dehydrated Fruits and Vegetables etc. Mumbai, Pune, Nagpur, Aurangabad are the important airports from where the export of horticultural products is possible.

Since 1990, in Maharashtra state by ambitious plans of an archard progress state's growth is increased in Fruit production and Fruit cultivation field. Now Maharashtra state is number one in the country in Fruit production. By the end of the year, 2004, total 13.22 lakhs hectare area under fruit cultivation of the state. Only Mango production is highest in fruit cultivation among sequently Cashewnut, Orange, Pomegranute, Mosambi, Banana, Grapes etc. In the production of fruits Maharashtra's Pomegranate and Grapes share is serially 82.33 per cent and 82.58 per cent in total India's Fruit production. On the world wide level state's Nagpur is famous for Orange, Nashik and Sangli for Grapes, Ratnagiri for Alphanso Mango, Jalgaon for Banana, Solapur for Pomegranate and Jalana for Citrus fruits.

**A) Onion :**

Onion is most important crops in Maharashtra. Onion shows a significant increase in its export. In 1993-94 Onion export was Rs. 13700 lakhs, which has increased to Rs. 25,730 lakhs in 2002-03. There is increasing trend by 87.81 per cent in 2002-03. The main problem of Onion export is the payment of exported commodities is delayed for nearly 180 days. The farmers waiting period is less, so farmers are not interested in export trading. Some

rich farmers, whose waiting capacity is more, they campell the society to undertake export trading, provided they have a quality produce and no market intelligence services and market extension services are made available etc.

**B) Vegetables :**

In the category of vegetables Potato, Tomato are included. Vegetables shows a very significant increase in its export. Vegetable shows a increasing trend by 663.88 per cent in 2002-03 over the base year 1993-94. In 1993-94 export of Vegetables was Rs. 1,980 lakhs which has increased to Rs. 15,125 lakhs in 2002-03.

**Table No. 6.2**  
**Export of Fruits and Vegetables from Maharashtra**

(Rs. in Lakhs)

<b>Sr. No.</b>	<b>Crops</b>	<b>1993-94</b>	<b>1997-98</b>	<b>2002-03</b>	<b>Difference</b>	<b>% Change</b>
1.	Onion	13700	18185	25730	12030	87.81
2.	Vegetables	1980	844	15125	13145	663.88
3.	Mango	2412	4416	5054	2642	109.53
4.	Grapes	3392	5941	5142	1750	51.59
5.	Other Fruits	2239	1090	1551	-688	-30.72

Source : Directorate of Horticulture, Government of Maharashtra, Pune.

The problem of Vegetables export is mainly, lack of proper infrastructure including storages, transport and chilling facilities have hindered the large-scale Fruit processing and exports. Besides, inadequate air cargo at reasonable rates at a time has been the major constraint in increasing many times due to failure of a particular crop and increased local demand has caused to restrict the exports. This has happened to onion in the year 1997-98- Suitable and exportable varieties are not developed. No proper packaging is made etc. Export of Vegetables are showing increasing trend it is very helpful for the state economy as well as Indian economy.

#### **C) Mango :**

Mango is the most important Fruits in Maharashtra state. Mango shows a significant increase in its export. Export shows an increasing trend by 109.53 per cent in 2002-03 over the base year 1993-94. In 1993-94 export of Mango was Rs. 2,412 lakhs which has increased to Rs. 5054 lakhs in 2002-03.

Among the export varieties Alphonso Mango of Kokan region and Kesar Mango of Aurnagabad and other part of Maharashtra, share good amount of share, whereas 5.40 per cent of the total Mango production in India is showed. The Mango importing countries are U.S.A., Canada, Russia, France, Switzerland, Kuwait, Kenya and Australia.

The main problem of Mango export is a weak market finance, export strategy has not set the marketing system. Brand names, inadequate storages, domination of private traders, lack of funds, lack of co-ordination between institutional agencies, lack of infrastructural facilities are the major problems faced by the horticulture sector in export trading.

#### **D) Grapes :**

Grape is the most important crops in Maharashtra. Maharashtra is Grape growing state in India. Almost all exportable grape quantity from India

is exported from Maharashtra. Specially, western Maharashtra is famous for the Grapes production.

The export of Grapes shows an increasing trend by 51.59 per cent in 2002-03 over the base year 1993-94. In 1993-94 export of Grapes was Rs. 3,392 lakhs, which has increased to 5,142 lakhs in 2002-03. Compared to other Fruits, Grapes shows a growth of 51.59 per cent which is very low. The main Grapes importing countries are England, USA, Germany, France, Netherlands and Sweden.

The main problem of Grapes export are, tendency of indiscriminate export, which are not based on prioritization of products in the context of strength or consumers choice, post harvest infrastructure is still weak, no sufficient air cargo on subsidised rates are available. Export strategy has not set the marketing system, subsidy to pre-harvest operations is being harvested by rich farmers. Export culture is not existing among the growers, lack of infrastructural facilities are some major problems faced by the horticulture sector in export trading.

#### **E) Other Fruits :**

The category of other Fruits its include Bananas, Cashewnut, Strawberry etc. The export of other fruits shows a significant decrease in its export. In 1993-94 export of other Fruits was Rs. 2,239 lakhs, which has decreased to Rs. 1551 lakhs in 2002-03. The export of other Fruits shows a decreasing trend by 30.72 per cent in 2002-03. Over the base year 1993-94. This is the only category, which shows the declining trend during the period under study.

This decrease is mainly due to lack of proper infrastructure, including storages, transport and chilling facilities have hindered the large scale fruit processing and exports and suitable and exportable varieties are not developed, no proper packaging is made, cold storage facilities at airport do not exist and strong data base is not available.

However, the day-to-day decrease in the share of agricultural sector in total national export is seen. It is not helpful for the state as well as India's economy.

## **6.6 CONCLUSIONS**

The broad conclusions that emerge from the study of trends in agricultural export in Maharashtra during the period 1990-91 to 2003-04 are summarized as follows.

The export of Fruits and Vegetables in Maharashtra shows an increasing trend during the period under study. The export of Onion shows an increasing trend by 87.81 per cent in 2002-03 over the base year 1993-94. In 1993-94 export of Onion shares Rs. 13,700 lakhs which has increased to Rs. 25,730 lakhs in 2002-03. The export of Vegetables also shows a very significant increase in its export. In 1993-94, export of Vegetables was Rs. 1,980 lakhs which has increased to 15,125 lakhs in 2002-03. There is an increasing trend by 633.88 per cent in 2002-03 over the base year 1993-94.

The export of Mango also shows an increasing trend by 109.53 per cent in 2002-03 over the base year 1993-94. In 1993-94 export of mango was Rs. 2,412 lakhs which has increased to Rs. 5,054 lakhs in 2002-03. The export of Grapes shows a small increase in its export. In 1993-94 export of Grapes was Rs. 3,392 lakhs which has increased to 5,142 lakhs in 2002-03. There is an increasing trend by 0.51 per cent in 2002-03 over the base year 1993-94.

The category of other fruits shows decreasing trend by 30.72 per cent in 2002-03 over the base year 1993-94. In 1993-94, export of other fruits was Rs. 2,239 lakhs which has decreased to 1,551 lakhs in 2002-03. This decrease is mainly due to lack of infrastructural facilities and processing facilities in the state.

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## **CHAPTER - VII**

### **CONCLUSIONS**

The agricultural production of the state has decreased during the period under study. About 21 per cent of the total income of the state comes from agriculture. Crop intensity of the state has increased. There is limited scope for increasing the cultivable area in the state, because Maharashtra seems to become a industrialized state and urbanization has also increased over a period of time resulting into the negative growth in the net sown area of the state. But the area under double sown is significantly increased and gross cropped area and gross irrigated area also shows a increasing trend during the period 1991 to 2004.

In the cropping pattern, the share of the non-food grains increased and that of the foodgrains declined giving same evidence of diversification in this direction. The area under Gram, other cereals, Tur, Other Pulses, Total Pulses and Cotton have shown an increasing trend whereas area under Rice, Wheat, Jowar, Bajara, Total Cereals, Total Foodgrains, Groundnut, Sugarcane and Tobacco have a decreasing trend in the principal crops in Maharashtra state during the period. This change in cropping pattern during the same period has influenced by other crops also. The land use pattern shows not very much change in each land use categories. It is observed that, the land put to non-agricultural uses and double sown area is significantly increased during the period under study.

The use of various agricultural implements like seed drills, sprayers, and dusters, chaff cutters, threshers etc. have shown a considerable increase, whereas the use of traditional implements like wooden ploughs, still ploughs, bullock carts etc. have experienced a decreasing trend. The trends of technological enhancement may influence the production of the yield. The area under various High Yielding Varieties of seeds like Paddy, Jowar etc. have shown an increasing trend. No HYV of any crop have shown decreasing trend, which indicate that, farmers of Maharashtra state are becoming

increasingly aware about the use of HYV. The overall consumption of chemical fertilizer shows an increasing trend in which again the Potassic and Phosphatic fertilizers have shown increasing trend whereas Nitrogenous fertilizers shows a decreasing trend by 8.42 per cent during the period under study.

The production of Rice, Wheat, Other Cereals, Total Pulses, Gram, Tur, Other Pulses, Total Cash Crops, Cotton and Sugarcane have shown an increasing trend. On the other hand the production of Total Cereals, Jowar, bajara. Groundnut and Tobacco have shown a decreasing trend during the period under study. Maharashtra state posses immense potential especially in Fruits and Vegetables mainly because of its climatic conditions. The export of Fruits and Vegetables from Maharashtra shows an increasing trend during the period of 1991 to 2004. The state has a 13.05 per cent and 5.03 -per cent share in country's total Fruits and Vegetable production respectively. The major Fruits and Vegetables exported from Maharashtra are Onion, Mango's, Grapes, Banana, Pomegranets etc.

It is observed that, the agriculture sector in Maharashtra faces with some of the emerging problems, which influences the overall agricultural production in negative direction. These emerging problems are lack of credit facilities, lack of suitable marketing system, lack of efficient irrigation methods, lack of awareness of emerging agricultural technology, small land holding, illiteracy, lack of proper planning, lack of extension of agricultural research from agriculture universities to the field of the farming, lack of infrastructural facilities, lack of storage and processing facilities and lack of modern mind sets of the farmers etc.

Following strategies have been suggested for the agricultural development in Maharashtra state.

#### **1. Development of infrastructure :**

The agriculture is not adequately supported by required infrastructure facilities. The transport and communication system is very weak in the rural areas. Even the power supply, input supply and credit supply systems are

most likely to fall short of the total requirements of developing agriculture. Systematic efforts are, therefore, needed to develop infrastructure facilities in different parts of the state.

## **2. Development and Utilization of land water resources :**

The growth of agricultural sector depends on the conservation, sustainable use and efficient management of soil and water resources without which ill environmental effects may cause. Various activities of watershed development, land reclamation, exploitation of potential water resources etc. should be given high priorities in the agenda of development planning. Besides contributing to conservation of natural resources, these activities are expected to result into additional employment and income generation in rural areas. Several economic studies reveal the positive impact of watershed development works on the farm economy.

## **3. Increasing the productivity of rainfall and irrigated agriculture**

The success of Green Revolution of late sixties and the seventies had revealed that, the introduction of High Yielding Varieties coupled with supporting public policies of input-output prices along with strengthening of input and credit delivery system have paid rich dividends to the country to become self-reliant in agricultural production. However, only a few areas blessed with favourable natural resources and past investments in development of irrigation water resources have been benefited from the Green Revolution. Concerted efforts are needed to extend the benefits to the remaining areas both from the economical and social justice point of view.

## **4. Acceleration process of capital formation in agriculture**

Capital is a constraint in developing agriculture. All efforts aiming at increasing capital use intensity would definitely carry a good dividend of increased productivity of land and labour resources. There is a need to stop the public and private investment in agriculture so as to support farmer is efforts to strengthen capital base of agriculture, especially in the areas, where the levels of agricultural production continue to be considerably lower, the

potential and at the same time strengthen the incentive framework for agriculture with a view to attracting more private investment into this sector.

#### **5. Evolution and transfer of new production technologies**

Quality seed is bedrock of increased agricultural production. The application of bio-technology, integrated nutrient management (INM), integrated pest management (IPM), high yield potential etc. need to be adopted on large scale. The irrigated pest and disease management needs to be given greater attention. The development of pest resistant varieties and use of bio-pesticides would be beneficial in the long run to sustain natural resource base. Strict regulations to monitor the quality of pesticides and their use are needed. Many a times, our extension education efforts fail short of the requirements of effective transfer of technology to the farmers. At the same time, quite a sizeable proportion of farmers do not respond positively to new technologies because of several price and non-price factors. The incentive framework must encompass a combination of productive technology package for various regions, adequate and timely availability of inputs including credit, infrastructure facilities for marketing and above all a stable and remunerative price environment.

#### **6. Improving marketing and processing system**

In general, the urban as well as rural markets are expanding in relation to population growth and increased purchasing power of people. Also, there are signs of shift in consumption patterns of people in favour of processed products. The marketing and processing system, however, seem to be inadequate and inefficient to support and safeguard interests of the producers and consumers under the changing circumstances. Conscious efforts are needed to improve marketing practices and establish processing units in accordance with the requirements of rising demand for agricultural produces both in their raw and processed forms. Establishment of linkages between producer cooperatives and consumer co-operatives coupled with efficient functioning of processing units could prove to be a great stride for removal of inefficiency in the internal trade in domestic economy.

## **7. Fostering high-tech agriculture and promoting export trade**

With the globalization of world trade, new markets have been opened for different agricultural products in various countries. India possesses several comparative advantages over many other countries to produce a variety of products for export trade purpose relatively at a cheaper cost. The export oriented products should, however, meet the quality requirements of the leading international markets. All out efforts are needed to increase production of quality products for export purpose. This task could successfully be accomplished by fostering high-tech agriculture production systems that are rather capital intensive. Also, our export policies be well tuned and made complementary to promotion of export trade with leading countries.

## **8. Effective programme implementation**

In general, our plans and development programmes seen to be quite all right from the view point of balanced growth of economy as a whole. This is true even with the agricultural sector. There have, however, been many lacunae at the level of implementation of plans and programmes. Lack of co-ordination among the implementing agencies, inadequacy of funds neglect for monitoring and evaluation efforts etc. have posed several problems in realizing the benefits from our development planning. Based on these lessons, we should try hard to enhance our programme implementation efficiency to the extent possible for extension of programmes concerning to development and utilization of irrigation water in view of increasing irrigation deserves a lot of significance for developing agriculture in Maharashtra. Maharashtra Government has declared the 'Krishi Saptak' plan including Crop Insurance Scheme, Organic Farming, Integrated Pest Management, market intelligence, marketing network, empowerment of farm women, agri export zones, marketing network etc. be given top most priority for sustainable agriculture in Maharashtra.

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