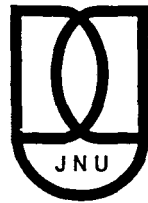


PERFORMANCE OF AGRICULTURAL SECTOR IN RAJASTHAN: SOME ISSUES

*Dissertation submitted to the Jawaharlal Nehru University in partial
fulfillment of the requirements for the award of the Degree of*

MASTER OF PHILOSOPHY

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Certificate

This is to certify that the dissertation entitled "**Performance of Agricultural Sector in Rajasthan: Some Issues**" being submitted to the Centre for Economic Studies and Planning, School of Social Sciences, Jawaharlal Nehru University, by Ms. Kapila Mallah, in partial fulfillment of the requirements for the award of **Master of Philosophy** has not been previously submitted for any other degree of this or any other university.

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Preface

The economy of Rajasthan is characterized by recurring droughts, inadequate irrigation facilities, environmental degradation and lack of social and economic infrastructure. The main occupation of the people of Rajasthan is agriculture, which contributes about 47 per cent of Net State Domestic product (NSDP). It has been seen that capacities against recurring droughts have not been developed in the state economy despite five decades of planning. The present study is an attempt to explore the changes in area, production and productivity of major crops in the state and the flow of institutional finance to agriculture in Rajasthan. The study also analyses the economic condition of the farmers by the terms of trade for the agriculture sector.

The work is mainly based on data from various publications of the state and central governments, and from state-level bankers committees. The study is divided into three chapters. Chapter One covers the economic profile of Rajasthan's agriculture during the last fifty years. In this chapter, land use patterns – net cropped area, gross-cropped area, fallow land and so on – sources of irrigation, irrigation potential created during Plan periods, major irrigation projects and their impact on the state economy are the various topics discussed.

This chapter also discusses land reform measures. The “land to the tiller” principle was adopted as the main plank in the scheme of land reform with a greater emphasis on equitable distribution of land. This section also presents a brief review of the Five-Year Plans of Rajasthan.

The second chapter is divided into two parts. The first part includes an analysis of crop performance in Rajasthan. It points out that increase in the growth rate of agriculture production during the pre-green revolution period (1952-53 to 1967-68) was due to an expansion in area under cultivation, and during the post-green revolution period (1967-68 to 2000) due to increase in productivity, due to the use of modern technology in agriculture. During the whole period the increase in agriculture production was recorded partly due to expansion in area under crops and partly due to increase in the productivity of land.

The second part of Chapter Two discusses the importance of credit flow in determining cropping pattern and productivity. This part deals with the various sources of institutional credit to agriculture such as cooperatives, commercial banks and regional rural banks. It is found that for higher productivity and output in agriculture, institutional credit plays a vital role.

Chapter Three covers the terms of trade for the agriculture sector in Rajasthan. It deals with the question of whether a successful shift in cropping pattern reflects any change in terms of trade. The final chapter brings together the findings of the previous chapters and discusses the implications for the agricultural sector in Rajasthan.

The theme, objectives and motives as well as the framework of this study are have been derived from the fact that there is inadequate coverage of the subject in current literature. The present study is an attempt to analyse the overall scenario of agriculture in Rajasthan.

Review of Literature

The review of literature that follows is limited because the core theme of the study, as mentioned earlier, has not been sufficiently dealt with in literature.

S. S. Acharya and D. P. Chaudhri in *Indian Agricultural Policy at the Crossroads: Priorities and Agenda* (2003) make a review of agricultural trade and marketing policy and conclude that there have been changes in cropping pattern in the country.¹

S. L. Yadav (2003) observes that government support plays a vital role in the progress of Agriculture growth. He reveals that during last twenty years there is a great shift in the cropping pattern of Rajasthan from food crops to cash crops.²

Rajagopalan (1968) brings out the factors which determine the credit demand and accessibility of credit. He summarizes the demand factors for credit such as farm liquidity, crop pattern and cropping intensity, size of the farm and farm labor, cost of credit and mode of transactions, degree of risks involved in production and local availability of managerial skills. Rajagopalan also states that farm assets enhanced the chances of procuring credit and farm liquidity determined the quantum of credit required and offered.³

¹ Acharya, S. S. and D. P. Chaudhri, *Indian Agriculture Policy at the Crossroads: Priorities and Agenda*, Rawat Publication, New Delhi, 2001.

² Yadav, Sundarlal, *Agriculture Planning in India*, Scientific Publishers (India), Jodhpur, 2003.

³ Rajgopalan, V. "Farm Liquidity and Institutional Financing for Agricultural Development", *Indian Journal of Agricultural Economics*, 26/41, 1968.

Thingalaya (1976) observes that borrowers continue to experience inaccessibility of credit, delay in credit distribution and inconvenience due to distantly located branches.⁴

Agarwal and Kunwant (1974) opine that lack of credit is the major constraint in the adoption of new technology. The inference made was that credit constraint was high among small farmers compared to large farmers. Organizational as well as technological changes would significantly increase the capital and credit requirements on all farms. The credit needs of the farms were therefore, expected to rise with further improvements in technology.⁵

Rao (1975), Singh (1986), Jodha (1973), reveals that income disparities widened in the economy with the technological changes but gains from technological changes have been shared by all sections. The distribution of institutional credit was biased towards the large farmers. Large farmers appropriated institutional credit more than proportionate to their share in land. Thus, the small farmer are derived their due share from institutional sources. This forces the small farmers to depend on money-lenders.⁶

Objectives of the Study

The main objectives of the study are:

- To examine the shift in cropping patterns as to highlight the trend and growth rates of area, production and productivity of major crops.

⁴ Thingalaya, N. K., *Marginal Farmers and Agricultural Labourers in South Kanara District: Economic Analysis*, Manipal, Syndicate Bank, 1976, pp. 27-32.

⁵ Agarwal and Singh, Kunwant, "Green Revolution, Capital Credit Requirements of Farmers in Semi-Arid Regions of Rajasthan, *Indian Journal of Agricultural Economics*, 29(1), 1974.

⁶ Rao, C. H. H., "Technological Change and Distribution of Gains in Indian Agriculture", Macmillan, New Delhi, 1975.

- To study the role of institutional finance in promoting agricultural sector in Rajasthan for growth in economy.
- To estimate the terms of trade for the agricultural sector in Rajasthan and analyze different aspects of behaviour of terms of trade.

Methodology

The analysis is mainly based on primary data. The publications of the state and the Central Governments used are: *Statistical Abstract – Rajasthan, Basic Statistics – Rajasthan, Some Facts About Rajasthan, Agricultural Statistics – Rajasthan, Agricultural Development in Rajasthan, Growth of Agriculture in Rajasthan, Vital Agriculture Statistics, Report of the Advisory Committee on Employment, Five Year Plans of Rajasthan* and their progress reports, *Five Year Plans of India* and *Economic Survey*.

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I dedicate this work to my mother and my soulmate Parula.

Kapila Mallah

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CHAPTER 1

AN ECONOMIC PROFILE OF RAJASTHAN'S AGRICULTURE

Rajasthan was constituted by the merger of a number of large and small principalities. Each of these had their own systems of administration and jurisprudence, with the ruler being the final arbiter. Very few gave any attention to improve their agriculture or to attract industries and commerce in their territories; fewer still showed any concern for social development of their citizenry. There were a few exceptions, but the general picture at the time of independence was that of under-developed economies, neglected populations and autocratic rulers.

Formation of Rajasthan

On the eve of independence, the state of Rajasthan (then known as Rajputana) was composed of 19 princely states, 2 chiefships and a British administered territory. Except Bharatpur, Dholpur and Tonk all the states were ruled by Rajput rulers. After independence the central power, the British, which kept them together, withdrew from the scene and a period of uncertainty ensued as the states were a choice to join the Indian union or opt out of it. Sardar Vallabh Bhai Patel, then the Home Minister of the country, after negotiating with the various rulers persuaded them to cede their territories to the Indian Union. This was a massive, complex and difficult undertaking. Sardar Patel always be remembered with gratitude by the people of India, particularly by the people of Rajasthan for accomplishing this Herculean task.

Natural and Physical Features

Rajasthan is the largest state in the Indian Union with a geographical area of 3.42 lakh sq. kms. Rajasthan being a predominantly agrarian state, 77 per cent of the population lives in rural areas and about 70 per cent depend on agriculture as their source of livelihood. Agriculture contributes about 40 per cent of state domestic product.

Rajasthan state can be broadly divided into following physiographic division¹:

- (i) ***Aravalli Hill System:*** Rajasthan is divided into two parts by the Aravalli ranges running diagonally for about 692 km from Delhi in the northeast to Champaner (Gujrat) in the southwest. Some 550 km of it lies in Rajasthan. The areas on the west and northwest sides of Aravalli ranges slope towards the Indus valley and the Rann of Kutch, with an undulating topography. The areas on eastern and southeastern sides of the Aravallis form a more diversified region. The Aravallis are discontinuous ranges, broken in the northeast of Sikar and Ajmer and are full of wide gaps at Sambhar, east of Sikar and between Ajmer and Beawar. The Aravalli ranges are higher in the southwest (600 m asl) with the highest peak (1350 m asl) located at Gurushikhar in Mount Abu. Its base is triangular in shape and lies between Udaipur, Sirohi and Dungarpur.
- (ii) ***Eastern Plains:*** The Eastern plains include the area on the eastern and northeastern sides of the Aravallis. It is composed of alluvium deposits

¹ Pratap Singh and P. L. Maliwal (2004) *Agriculture Development in Rajasthan*, Agrotech Publishing Academy, Udaipur.

of rivers flowing from Aravalli range. Large parts of this alluvium in Ajmer and Jaipur districts are mixed with sand carried there with wind through the gaps in Aravallis. The eastern plain extends from the eastern part of Udaipur through Bhilwara, Tonk, Jaipur, Sawai Madhopur and Alwar.

- (iii) ***Southeastern Plains:*** The Southeastern plains cover the districts of Bharatpur, Kota, Jhalwar and parts of Sawai Madhopur and Bundi. The area is formed by the alluvium from the Deccan trap and the Vindhya system brought by the river Chambal and its tributaries – Banas, Parvati and Kalisindh.
- (iv) ***Southern Plains:*** The Southern Plains begin from the southeastern part of Udaipur land and extend to Banswara, Dungarpur and Southern Chittorgarh district. The land is formed by the alluvium of the Aravallis brought down by the river Mahi and its tributaries which ultimately drain into the Gulf of Khambhat. The physiography of the southern plain is typically carved out with separate hillocks and deep valleys.
- (v) ***Alluvial Plains of Mid-West:*** This land mass stretches out from the foot hills of Aravallis and goes up to the sandy desert plain on the west. The river Luni originating from near Ajmer, flows through parts of Jodhpur, Pali, Jalore and Barmer district to the Rann of Kutch. The Shekhawati Area covering, Sikar, Junjhunu and northeastern parts of Jaipur and Ajmer district is a plain area of inland drainage. This area is characterized by large sand dunes and shallow depressions. The salt lakes of Sambhar, Panchpadra, Kuchamun and Didwana fall in the area.

- (vi) ***Sandy Plain and Desert Pedo-Plain:*** The plain constitutes part of the Great Indian Desert and covers the districts of Jaisalmer, Bikaner, Churu, Western Barmer, Nagaur and Jodhpur districts. It extends beyond the border into Pakistan. In this part, vast stretches of Aeolian deposits from the coastal area are found mixed with rocky outcrops of sedimentary origin. These plains are intercepted by sand dunes of varying sizes and shapes which may be partially or fully stabilized or may be active or shifting.
- (vii) ***North Western Flood Plain:*** It covers most of the Sriganganagar and Hanumangarh districts. Here the alluvium brought from the Shivaliks is extremely variable in nature. The entire rock system of Rajasthan belongs to Palaeozoic, Proterozoic and Archean era and varies widely in composition.

State of Agriculture in Rajasthan

On the basis of two well-known measures share of agriculture in State Domestic Product (SDP) and share of agricultural workers in the workforce, the importance of agriculture in Rajasthan's economy is quite evident. Agriculture and allied sector dominates the state economy as a high proportion of working population is engaged in this sector. As per the Census Report of 1991 and 2001 of the Government of Rajasthan, about 70 per cent of the state's working population is engaged in agriculture and allied activities including mines. Thus, over a period of a two decades from 1981 to 2001, there has not been any remarkable change in the occupational pattern in Rajasthan. During the last decade, barring some exceptional years, share of agriculture in SDP has fluctuated between 45 to 50 per cent, with no discernible or strong trend.

Both these characteristics, i.e., dominant share in SDP and in the workforce, are common to several other states in the country. In the case of Rajasthan, however, fluctuations in SDP can be directly related to the fluctuations in agricultural production. A good agricultural year boosts SDP while a bad agricultural year brings down SDP. So long as major structural change does not take place in Rajasthan's economy, agriculture will continue to play the pivotal role.

In Rajasthan, agriculture has been the source of supply of food grains, and the supply of raw material to cotton textile, edible oil, and other industries. Importance of agriculture in the state arises from the role it plays in the state's trade. Agriculture and dairy products such as sugarcane, oilseeds, wheat, pulses, milk, ghee and butter, meat and eggs and hides contributes the main items of export of Rajasthan to other states of Indian Union. Thus, the prosperity of the state economy largely depends upon the prosperity and development of agriculture.

Economic Organization of Agriculture

Agricultural development is conditioned by five important variables. Since agriculture is basically a land and water based activity, the quality and quantity of these resources condition the progress to a large extent. The second important determining factor is the agrarian structure, which is generally indicated by the access to land, although a wider interpretation of agriculture structure would include access to the institutions supporting agriculture, e.g., credit institutions. The third factor is the technology availed of and adopted by the farmers. Access to markets and terms obtained by the producers for their products are other critical variables in understanding the performance of agriculture. Finally, institutional support, particularly that provided by the self-

help institutions is a factor that could have serious impact especially on agriculture by small farmers.

Land Use Pattern

Total area of the state can be divided into two major categories

- (a) **Arable land**: Arable land include net area sown, fallow land current and other than current fallow, cultivable waste, permanent pastures and other grazing land, and land under miscellaneous tree crops and groves, etc.
- (b) **Non-Arable Land**: Non-arable land includes forests, land put to non-agriculture use and barren and uncultivated lands. The arable lands increased from 267.8 lakh hectares in 1960-61 to 237.7 lakh hectares in 1999-2000 and non-arable declined from 70.6 lakh hectares in 1960-61 to 68.9 lakh hectares in 1999-2000.

Land utilization indicates broadly the ways in which the land of the state utilized. Land utilization means land put to various uses, for example, production of food, fibre and fodder, forest and non-agriculture uses. Table 1.1 reveals the land use pattern in the state from 1960-1961 to 1999-2000.

- (ii) **Forest land**: Area under forests includes all land classified as forests by law or administered as forests, whether state-owned or private. Table 1.1 shows that the area under forests in Rajasthan increased from 8.1 lakh hectares in 1960-1961 to 25.8 lakh hectares in 1999-2000. Thus area under forests increased by 219 per cent between 1960-1961 to 1999-2000.
- (iii) **Land not available for cultivation**: It includes (a) Land put to non-agricultural uses and (b) barren land (includes mountains, deserts, etc.). Area not available for cultivation declined from 62.5 lakh hectares (18.5 per cent) in 1960-61 to 43.1 lakh hectares (12.8 per cent) in 1999-2000. Thus, this area declined by 31 per cent in this period. While the area under barren and uncultivated land decreased by 50 per cent between the same time.

Table 1.1: Land Use Pattern in Rajasthan

(In Lakh Hectares)

	1960-61	1970-71	1980-81	1988-89	1989-90	1990-91	1991-92	1992-93	1999-2000
1. Reporting Area for Land Utilization Purpose	338.4 (100)	341.1 (100)	342.3 (100)	342.5 (100)	342.5 (100)	342.5 (100)	342.5 (100)	342.5 (100)	342.6 (100)
2. Forest	8.1 (2.4)	13.6 (4.0)	20.9 (6.1)	23.1 (6.7)	23.2 (6.8)	23.5 (6.8)	23.7 (6.9)	24.0 (7.0)	25.8 (7.5)
3. Land Not-available for Cultivation	62.5 (18.5)	58.8 (17.2)	44.3 (12.9)	44.6 (13.0)	44.4 (13.0)	42.8 (12.5)	43.9 (12.8)	43.8 (12.8)	43.1 (12.6)
a. Land Put to Non-agricultural Uses	11.0 (3.2)	11.6 (3.4)	15.1 (4.4)	16.6 (4.8)	16.2 (4.7)	14.9 (4.3)	16.4 (4.8)	16.5 (4.8)	17.3 (5.0)
b. Barren and Uncultivated Land	51.5 (15.2)	47.2 (13.8)	29.2 (8.5)	28.0 (8.2)	28.2 (8.2)	27.9 (8.1)	27.5 (8.0)	27.3 (8.0)	25.8 (7.5)
4. Other Uncultivated Land	17.0 (5.1)	18.2 (5.3)	18.6 (5.4)	18.3 (5.3)	18.3 (5.3)	19.3 (5.6)	18.1 (5.2)	17.9 (5.2)	17.3 (5.0)
a. Permanent Pastures and Other Grazing Land.	16.9 (5.0)	18.1 (5.3)	18.3 (5.4)	18.0 (5.3)	18.0 (5.3)	19.1 (5.6)	17.9 (5.3)	17.7 (5.2)	17.1 (5.0)
b. Land Under Miscellaneous Tree Crops and Groves.	0.2 (0.05)	0.1 (0.03)	0.2 (0.07)	0.3 (0.08)	0.2 (0.07)	0.2 (0.06)	0.2 (0.06)	0.2 (0.06)	0.1 (0.04)

Continued...

5. Culturable Waste (Excluding Fallow Land)	68.4 (20.2)	61.1 (17.9)	64.2 (18.7)	57.2 (16.7)	56.3 (16.4)	55.7 (16.3)	55.6 (16.2)	53.5 (15.6)	49.9 (14.6)
6. Fallow Lands	51.3 (15.1)	37.7 (11.0)	41.7 (12.2)	38.2 (11.1)	44.2 (12.9)	37.4 (10.9)	46.3 (13.5)	34.0 (9.9)	51.5 (15.0)
a. Fallow Other Than Current Fallows.	31.1 (9.2)	23.3 (6.8)	20.9 (6.1)	22.9 (6.7)	20.8 (6.1)	19.3 (5.6)	21.8 (6.3)	18.6 (5.4)	25.1 (7.3)
b. Current Fallows	20.2 (6.0)	14.4 (4.2)	20.9 (6.1)	15.3 (4.5)	23.4 (6.8)	18.1 (5.3)	24.6 (7.2)	15.4 (4.5)	26.4 (7.7)
7. Net Area Sown	131.1 (38.7)	151.8 (44.5)	152.7 (44.6)	161.2 (47.1)	156.1 (45.6)	163.8 (47.8)	154.9 (45.2)	169.4 (49.5)	155.1 (45.3)
8. Area Sown More Than Once	9.0 (2.7)	15.5 (4.5)	20.8 (6.1)	27.2 (7.9)	23.0 (6.7)	30.0 (8.8)	26.0 (7.6)	32.3 (9.4)	37.8 (24.4)
9. Total (Gross) Cropped Area (7+8)	140.1 (41.4)	167.3 (49.0)	173.5 (50.7)	188.4 (55.0)	179.0 (52.3)	193.8 (56.6)	180.9 (52.8)	201.7 (58.9)	193.0 (56.3)

Sources:

Statistical Abstract, Rajasthan, (Various Years): DES, Rajasthan, Jaipur.

Agricultural Statistics Rajasthan, 1991-92, DES, Rajasthan, Jaipur, 1993.

Vital Agriculture Statistics, 1993-94, Directorate of Agriculture, Rajasthan, Jaipur, 1995.

- (iv) **Other un-cultivated land**: It consists of (a) permanent pastures and other grazing land: includes all grazing lands such as permanent pastures and meadows and village common grazing land. (b) land under miscellaneous tree crops and groves includes casuarinas trees, thatching grasses, bamboo bushes and other groves for fuel etc. Area under other uncultivated land increased from 17.0 lakh hectares (6.0 per cent) in 1960-61 to 17.3 lakh hectares (5.2 per cent) in 1999-2000. Thus, this area increased by a mere 2 per cent between 1960-61 to 1999-2000.
- (v) **Culturable waste (excluding fallow land)**: Culturable waste includes lands available for cultivation but not cultivated during the previous 5 or more years. These lands may either be fallow or covered with shrubs and jungles which are not put to any use culturable waste lands declined from 68.4 lakh hectares (20.2 per cent) in 1960-61 to 49.9 lakh hectares (14.6 per cent) in 1999-2000. Thus, this area declined by 27 per cent between the same time.
- (vi) **Fallow Lands**: These are cultivable and cultivated land but remain uncultivated or fallow during a given year. Fallow lands are classified into (a) current fallows represent cropped areas that are kept fallow during the current year. For example, seeding area may not be cropped in the same year. Area under current fallows increased by 30.1 per cent between 1960-61 and 1999-2000. (b) Fallow other than current fallow include all lands which are taken up for cultivation but are temporarily out of cultivation for a period not less than one year and not more than five years. The reason for keeping such lands fallow may be: (i) unremunerative nature of farming (ii) poverty of the cultivators (iii) inadequate supply of water (iv) water logging and (v) silting of canals

and rivers, etc. Area under fallow lands other than current fallows declined by 19 per cent between 1960-61 and 1999-2000.

- (vii) **Net Area Sown**: In computing the net area sown, areas sown more than once are counted only in the same year. Net area sown increased from 131.1 lakh hectares (38.7 per cent) in 1960-61 to 155.1 lakh hectares (45.3 per cent) in 1999-2000. Thus, these are increased by 18.3 per cent between the same year.
- (viii) **Area Sown More Than Once**: Area sown more than once represents the area sown with two and more than two crops in the same year. Area sown more than once increased from 9.00 lakh hectares to 37.8 lakh hectares in 1999-2000. Thus, this area increased by 320 per cent between 1960-61 and 1999-2000.
- (ix) **Total Cropped Area**: Total cropped area is the sum of net area sown and area sown more than once. Thus, total cropped area represents total area covered with crops during a year. Total cropped area increased from 140.1 lakh hectares (41.4 per cent of total geographical area) in 1960-61 to 193.0 lakh hectares (56.3 per cent) in 1999-2000. Thus, total cropped area increased by 38 per cent between 1960-61 and 1999-2000.

Factors which affect land use are irrigation, rainfall, soil, economic condition of the cultivators and agricultural prices incentive prices (minimum support prices and procurement prices). The land use varies from one region to another and even from one district to another district. Western part of Rajasthan is sandy and situated in the Great Indian Thar Desert where rainfall is a very important factor affecting the land use.

Irrigation

Water is a scarce resource in Rajasthan, but it is the most critical input for agriculture development. Nothing moves in Rajasthan unless agriculture moves. No input is more important than water which can improve agriculture. Irrigation in a large area is done through open well or tube wells because canal irrigation system is available in a very limited area. The use of water is not proper, with the result that it does not reach the tail end.

The cropping pattern is also based on availability of irrigation water. Double and multiple cropping is possible with adequate and assured water supply. Irrigation is of much importance in Rajasthan, particularly in western Rajasthan, where rains are scanty and erratic. Irrigation helps a lot in raising production and productivity of land. Irrigation enables the application of modern inputs like chemical fertilizers and HYV seeds.

Organized irrigation facilities meet the special needs of different soils. In Rajasthan, soils are good but lack sufficient moisture content. Rainfall is concentrated in four months of the monsoon season. Rainfall is high in the eastern and the southern parts but scanty in the western part of the state.

These disparities can be narrowed by assured irrigation facilities. Irrigation or water supply is essential in the state to protect the arid region from recurring famines. Assured water supply enables small and marginal farmers to do intensive agriculture. The inferior quality land which is being used for inferior crops can be put to use for superior crops with assured water supply, and water management.

Sources of Irrigation

The Sources of irrigation in Rajasthan are:

- (i) Well and Tube Wells
- (ii) Canals
- (iii) Tanks, and
- (iv) Other sources.

Table 1.2 reveals plan wise irrigated area. Average irrigated area per annum by canals increased from 2.5 lakh hectares during the First Plan period (1951-56) to 10.2 lakh hectares during the Seventh Plan period (1985-90) and 16.2 lakh hectares in 1999-2000. Average irrigated area per annum by tanks decreased from 1.3 lakh hectares during the First Five Year Plan period to 1.00 lakh hectares during the Seventh Plan period and decreased to 0.8 lakh hectares in 1999-2000. Average irrigated area by well and tube wells increased from 8.1 lakh hectares during the First Plan to 38.7 lakh hectares in 1999-2000. Average irrigated area by other sources increased from 0.2 lakh hectares during the First Plan period to 0.4 lakh hectares area during the Seventh Plan period and increased to 0.5 lakh hectares in 1999-2000.

In the analysis of year-wise irrigated area under different crops it is seen that the irrigated area under cereals increased from 11.2 lakh hectares in 1960-61 to 35.3 lakh hectares in 1999-2000 and the irrigated area under rice increased by 500 per cent, under wheat by 363 per cent, under pulses by 131 per cent, and under food grain by 209 per cent, in the above mentioned period. The irrigated area under jowar declined by 90 per cent and under barley by 57 per cent during the same period.

The irrigated area under total oilseeds increased tremendously by 6400 per cent, under groundnut by 800 per cent and under rapeseed and mustard by 5833 per cent between 1960-61 and 1999-2000. The irrigated area under cotton increased by 338 per cent but under sugarcane declined by 50 per cent between the same periods. Total irrigated area under different crops increased by 296 per cent between 1960-61 and 1999-2000.

Table 1.2: Net Irrigated Area by Source: Plan Wise (Average of Each Plan Period)

(Area: Lakh Hectares)

Source	I Plan 1951-56	II Plan 1956-61	III Plan 1961-66	Annual Plans 1966-69	IV Plan 1969-74	V Plan 1974-79	VI Plan 1980-85	VII Plan 1985-90	VIII Plan 1992-97	1999-2000
Canals	2.5 (20.7)	3.8 (24.5)	4.9 (28.0)	6.2 (32.1)	8.0 (36.2)	0 (33.5)	10.2 (32.7)	12.7 (35.7)	13.5 (34.6)	16.2 (28.9)
Tanks	1.3 (10.7)	2.3 (14.8)	2.0 (11.4)	2.2 (11.4)	2.0 (9.0)	2.2 (8.2)	1.4 (4.5)	1.0 (3.9)	1.6 (4.1)	0.8 (1.4)
Wells and Tubewells	8.1 (66.9)	9.2 (59.4)	10.2 (58.4)	10.7 (55.4)	11.8 (53.4)	15.4 (57.2)	19.2 (61.5)	21.5 (60.4)	23.6 (60.5)	38.7 (69.0)
Others	0.2 (1.7)	0.2 (1.3)	0.4 (2.3)	0.1 (0.5)	0.3 (1.4)	0.3 (1.1)	0.5 (1.6)	0.4 (1.1)	0.3 (0.8)	0.5 (0.9)
Net Irrigated Area	12.1 (100.0)	15.5 (100.0)	17.5 (100.0)	19.3 (100.0)	22.1 (100.0)	26.9 (100.0)	31.2 (100.0)	35.6 (100.0)	39.0 (100.0)	56.1 (100.0)
Gross Irrigated Area Irrigated Area Over.	14.4	18.3	19.4	22.5	25.3	31.3	38.8	43.7	46.5	69.3
Gross Cropped Area	12.7	13.3	13.8	14.7	15.1	18.6	21.4	24.8	26.0	35.8
Net Cropped area	11.4	12.2	12.4	13.4	14.7	18.0	20.0	23.4	28.4	36.2
Irrigation intensity (%)	119.2	118.1	118.0	117.8	115.1	116.4	124.5	123	119.0	137.2

Source:

- (i) Agriculture in Rajasthan: A Statistical Hand Book, 1989; Department of Agriculture, Rajasthan, Jaipur.
- (ii) Agriculture Statistics, 1991-92, DES Jaipur, 1993.
- (iii) Vital Agriculture Statistics, 1993-94, Directorate of Agriculture, Rajasthan, Jaipur 1995.
- (iv) Statistical Abstract, Rajasthan 2000, DES, Jaipur.

Major Irrigation Project in Rajasthan

The major irrigation projects in Rajasthan include: -

- (i) **Rajasthan Canal Project (Now Indira Gandhi Nahar Project)**: The work on Indira Gandhi Nahar Project, formerly known as Rajasthan Canal Project, was taken up in 1958. The project, the largest in the world will command a gross area of 32.4 lakh hectares on completion. The work of Indira Gandhi Nahar Project is being executed in the district of Churu, Sriganganagar, Bikaner, Jaisalmer, Jodhpur and Barmer to utilize 7.6 million acre feet (MAF) water (out of a total 8.6 MAF allocated to Rajasthan).

- (ii) **Chambal Project**: It is a joint venture of Rajasthan and Madhya Pradesh designed to control the floods of the Chambal and utilize its water for irrigation, power generation and drinking purposes. The project consists of three stages. The first stage is made up of (i) construction of Gandhi Sagar Dam, (ii) conservation of water near Chaurasingarh and (iii) construction of a power house at the dam site. The Gandhi Sagar Dam has been constructed at the head of the Chambal Gorge. This dam is designed to store water of two successive monsoons from the a catchment area of 22.5 sq. km. Water in the river is dependent on monsoon which is quite uncertain to maintain a regular supply of water of the power station and also for irrigation at Kota. The Gandhi Sagar maintains the minimum store of water for use in the years of scanty rainfall.

The second stage consists of the construction of (i) Rana Pratap Sagar Dam located at Rawat Bhatta and (ii) the power station at Rana

Pratap Sagar Dam. The third stage consists of the construction of Kota Dam on the Chambal River. Area irrigated by the project increased from 0.2 lakh hectares in 1960-61 to 2.2 lakh hectares in 1980-81 and 2.93 lakh hectares in 1992-93. The project also alleviated the chronic problems of unemployment and under-employment in the area by creating additional jobs opportunities.

- (iii) **Bhakra Nagal Project**: The Bhakra Nagal Project is a multi-purpose project jointly executed by the states of Rajasthan, Punjab and Haryana. The Bhakra reservoir is situated on the Sutlej. The system is dependent upon the discharge of the Sutlej River. The share of Rajasthan in this project is 15.2 per cent. Nohar, Bhadra and Suratgarh, Raisengnagar, Padampur and Ganganagar tehsils of Sriganganagar district and Hanumangarh tehsil of Hanumangarh district get irrigation facility through the Bhakra Canal Project. The total cost of the project was Rs. 236 crores, out of which Rajasthan share was Rs. 23.9 crores. Bhakra Nagal Project supplies power to Churu, Bikaner, Ganganagar, Jhunjhunu, and Sikar districts of Rajasthan.
- (iv) **Mahi Project**: The Mahi Bajaj Sagar project is a joint venture of the Rajasthan and Gujarat states. It is constructed near Banswara and provides power and irrigation benefits in Rajasthan in 180 thousand hectares with 89 per cent intensity of irrigation. The project has three components: Unit I consist of the Dam and appurtenant works; unit II includes irrigation, navigation, Embankment and Drainage work; and unit III includes the power system.
- (v) **Gang Canal Project**: The Gang Canal Project originates from the left bank of the river Sutlej and Husaniwala. The project provides irrigation

facilities to Sriganganagar and Bikaner districts. Irrigation area increased from 2.8 lakh hectares to 2.93 lakh hectares as a result of this project.

- (vi) **Beas Project**: This is also a multipurpose project by Rajasthan, Haryana and Punjab. The Pong Dam on the river Beas irrigates 21 lakh hectares of land in all three states and maintains the water supply in the Indira Gandhi Canal Project in winter.
- (vii) **Narmada Project**: This project is a joint venture of Rajasthan and Gujarat states. The project is designed to provide irrigation benefits to 1.4 lakh hectares culturable command area of Sanchora and Guda Malani tehsils of Jalore and Barmer district respectively.
- (viii) **Jawai Dam Project**: It is constructed at Jawai River near Arinpura railway station in Pali district. The main objective of constructing this dam was to provide drinking water to Sirohi, Pali, Jalore and Jodhpur district and also to provide irrigation facilities to a large area of western Rajasthan.

By the utilization of the facilities generated by these projects, the economy became prosperous. Irrigated area as a result these canal projects, increased from 5.8 lakh hectares in 1961-61 to 17.6 lakh hectares in 1999-2000. The total production of food grains increased from 45.5 lakh tones in 1960-61 to 88.4 lakh tones in 1970-71, and 129.3 lakh tones in 1998-99. The districts of Ganganagar, Kota, Bundi, Jalore, Pali, Sirohi, Tonk and Udaipur can increase production still further by using water more efficiently along with modern inputs and technology.

Land Reform

Land reforms aim at providing security of tenure, fixation of rent, conferment of ownership, etc. The entire concept of land reforms aims at abolition of intermediates and bringing the actual cultivator in direct contact with the state. The provision of security of tenancy and rent regulation provides a congenial atmosphere in which the cultivator feels sure of reaping the fruits of his labour.

The objectives of land reforms are:²

- (a) Greater equality;
- (b) The efficiency of resource use;
- (c) Establishment of direct relationship between tiller of the land and the state;
- (d) Social and economic justice.

The first objective has got two dimensions. First, there may be an attempt to introduce greater equity among those holding the land. The effort may be to reduce income disparities between big farmers and small farmer by redistributing the land from the former to the latter. Second, there may be an attempt to improve equity between farmers as a whole.

The second objective of the land reforms is the efficiency in resource use. Efficiency in resource use can also be brought about by redistribution of land. Direct relationship between tiller of land and the state can be established

² Khusro, A. M., "Land Reforms Since Independence", in V. B. Singh (ed.), *Economic History of India, 1857-1956*, New Delhi, 1975.

by abolition of intermediaries. Social and economic justice can be achieved by placing a ceiling on holding and distribution of surplus land.

The principal programmes and measures to fulfill land reform objectives include:

(1) Abolition of Intermediaries

The Rajasthan land reforms and resumption of Jagirs Act 1952, which provided for the resumption of Jagir lands and other measures of land reforms, came into force in February 1952. All Jagirs whether, settled or unsettled whatever their income had been resumed. Religious Jagirs with an income of less than Rs. 1000 per year had not been resumed. The big ex-jagirdars were given bonds but the comparatively small ex-jagirdars were paid in cash. The compensation paid to Zamirdars and Biswedars up to November 1961 was amounting to Rs. 895 lakh only.

(2) Tenancy Reforms

Under the Zamindari system, tenancy cultivation had been quite common in Rajasthan. Tenancy cultivation was done by small peasant who found that they had an insufficient quantity of land or it was carried on by landless labourers. Tenants were divided into three categories:

- (i) Occupancy or permanent tenants,
- (ii) Tenants at-will or temporary tenants, and
- (iii) Sub tenants.

The rights of tenancy of the occupancy tenants were permanent and heritable. They could receive compensation from landlords in case they made

some improvements on the land. They enjoy a fixity and security of tenure which made them the virtual owners of land. The only difference between the occupancy tenant and the peasant was that the former was required to pay rent to the landlord and the latter to pay land revenue to the state. Occupancy tenants were treated as land owners. The position of tenants-at-will and that of sub-tenants was extremely weak. They were subject to exploitation.³

Measures of tenancy reform for: -

(A) **Protection of Tenants from Ejection**

Anticipating the legislation, the jagirdars, zamindars, and other land holders had started ejecting or dispossessing their tenants from their holdings in an arbitrary manner. In order to check this wholesale ejection, the Rajasthan government issued the Rajasthan (Protection of Tenants) Ordinance in June 1949. This ordinance offered them protection against arbitrary ejection. The ordinance continued in force till the Rajasthan Tenancy Act, 1955 came into force and the important provision of the ordinance were embodied in this act.⁴

(B) **Protection of Tenants from so-called 'Voluntary Surrender'**

In order to protect tenants from the so-called 'voluntary surrender', the Rajasthan Tenancy Act, 1955 was amended in 1958. This amendment came into force from December 1958. All future surrenders were to be accompanied with a statement duly attested by the Tehsildar.

³ P. C. Joshi, *Land Reforms in India*, New Delhi, 1975.

⁴ *Ibid.*

(C) Regulation and Reduction of Rents

The Rajasthan Produce Rent Regulating Act 1951 was enacted in June 1951. This act fixed the maximum share to be recovered from the tenants at one-fourth of the gross produce. The maximum rent recoverable was later reduced from one-fourth to one-sixth of the gross produce under the Rajasthan Produce Rent Regulating Act, 1952. A uniform procedure was laid down for the settlement of disputes between the landlords and the tenants with regards to the division of the produce by Rajasthan Act No. 22 of 1953.

(3) *Ceiling on Agricultural Holdings*

Imposition in Rajasthan Tenancy Amendment Act, 1960 (Rajasthan Act No. 4 of 1960) and the ceiling areas of the various parts of the state in terms of this Act had been worked out. Under this act, the ceiling of a holding for a family of five persons was fixed at 30 standard acres (12.14 standard hectares) of land and a standard acre was defined as an area capable of yielding 3.7 quintals of wheat in a year. For the area to be resumed on the imposition of ceiling, the state government would pay compensation at 30 times the sanctioned rent rates in respect of the first 25 acres of land vested in the state government, 25 times the sanctioned rent-rates in respect of the next 25 acres and 20 times the sanctioned rent rates in respect of the remaining portion of the surrendered land. The compensation was paid in cash or in bonds. The surrendered land was let out to landless and other persons.⁵

The state government had also taken effective steps for the rehabilitation of ex-jagirdars and had allotted lands with other concessions in Bhakra and

⁵ Third Five Year Plan 1961-66, Rajasthan.

Chambal Project areas of the state. Landless persons were allotted land free of cost, under the Rajasthan Land Revenue Rules, 1957.

The landlord classes opposed the ceiling legislation and a number of loopholes were left in the ceiling legislation. Therefore, evasion was possible even within the legal provision. The range of ceiling provided in the ceiling act by the state also was too large (30 acres or 12.14 hectares). Thus, ceiling on land holdings was never implemented properly. As a result, up to 1991-92, 1.7 lakh hectares ceiling surplus land had been allotted to 74,000 allottees. Only 30 per cent of the allottees have actual possession of the allotted land. Out of 74,000 allottees, 20.5 thousand allottees have been assisted.

Although land reform programmes were started with great enthusiasm, soon the vitality of this enthusiasm was lost. The implementation of land reforms became a very tame affair. Even if land reforms were conceived with the proper perspective, they became riddled with loopholes.⁶ The main reasons for non-implementation of land reforms are:

- (a) Lack of political will
- (b) Absence of up to date land records
- (c) Absence of pressure from below, poor peasants and agricultural labourers are passive, unorganized and inarticulate; the lukewarm and apathetic attitude of the bureaucracy; and legal hurdles in the way of implementation of land reforms.⁷



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⁶ P. C. Joshi, "Land Reforms Implementation and Role of Administrator, *Economic and Political Weekly*, September 30, 1978.

⁷ *Report of the Task Force on Agrarian Relations* (1973), Planning Commission, Government of India.

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A Brief Review of the Five Year Plans in Rajasthan

Rajasthan made remarkable progress under the various Five-Year Plans. The basic objectives of successive Five-Year Plans have been:

- (i) a significant step up in the rate of growth of the state economy;
- (ii) optimum utilization of benefits from potential already created in the economy;
- (iii) raising the standards of living of the weaker section of the society;
- (iv) provision of the basic social services within the overall frame work of economic growth with social justice;
- (v) provision of employment opportunities for unemployment;
- (vi) reduction in regional disparities;
- (vii) greater emphasis on programmes aiming at poverty alleviation;
- (viii) progressive reduction in the rate of population growth and
- (ix) reduction in the gap in per capita income in the state and national average.

Priorities in the Different Five Year Plans

During the First Five-Year Plan (1951-56), the main priorities were to increase agricultural production, create facilities for irrigation and power, to provide basic social services in the form of education and medical facilities and to arrange for drinking water supply.

In the Second Five-Year Plan (1956-61), the emphasis on agriculture, irrigation, power and social services continued with considerably greater account on irrigation and power. In the Third Five-Year Plan (1961-66), the overall stress for creating infrastructural base in the form of irrigation and power projects was continued. An elaborate programme for industrial development of the state was also undertaken. In the Fourth Five-Year Plan (1969-74), concentrated attention was paid for creation of employment opportunities and lifting the weaker sections, development of drought-prone areas, dairy development and command area development.

In the Fifth Five-Year Plan (1974-79), economically weaker section was accorded a very high priority. Minimum need programme was introduced for providing basic social services. Investment of Rs. 1963.0 crores was made during the first three decades (from 1951-52 to 1979-80). The strategy for the Sixth Five-Year Plan (1980-85) envisaged speedy rural development with emphasis on poverty eradication through economic programmes like Integrated Rural Development Programme (IRDP) and employment generation programme. During this plan, the investment was of Rs. 2120.45 crores which was more than the combined investment made in the previous three decades of planned development. The basic priorities for the seventh five year plan (1985-90) were food, work and productivity, maximization of production in key sectors of economy, reduction in poverty and an increasing emphasis on employment-oriented programme. The investment was of Rs. 3106.2 crores which was Rs. 106.3 crores more than the proposed outlay of Rs. 3000 crores.

The priorities accorded in the Eighth Five-Year Plan (1992-97) are: (a) to reduce the gap in per capita income in the state and the national average; (b) poverty alleviation; (c) reduction in the rate of growth of population; (d)

substantial growth employment opportunities; (e) emphasis on diversification of agricultural base with greater thrust on sectors like horticulture, livestock, etc; and (f) improving educational standard. The proposed outlay for the eight plan was Rs. 115,000 crores which was more than the combined investment made in the previous four decades of planned development. Total proposed expenditure in the Eighth Plan was 213 times more than the actual expenditure made in the First Five-Year Plan.

The objectives and priorities laid down in the Ninth Five-Year Plan (1997-02) were: (i) priority to agriculture and rural development to generate adequate productive employment and eradicate poverty; (ii) to accelerate the growth rate of the economy while keeping the price stable; (iii) ensuring food and nutrition security for all, particularly vulnerable sections of society; (iv) providing basic minimum services of safe drinking water, primary education, shelter and connecting to all in a time bound manner; (v) containing the growth rate of population; (vi) ensuring environment sustainability of the development process; (vii) empowering women and socially disadvantaged group; (viii) promoting and developing people's participatory institutions; (ix) strengthening efforts to build self-reliance. The total proposed expenditure in the Ninth Plan was 27443.8 crores, 425 times more than the expenditure made in the First Five-Year Plan.

Growth Rates, Sectoral Expenditure, Per Capita Income of the State

The sectoral expenditure reveals that the overall thrust has been on development of strong infrastructural base in the form of irrigation and power facilities followed by development of social and community services. The emphasis on these sectors has resulted in creation of a fairly satisfactory infrastructural base and development of basic social and community service.

In the First Plan, irrigation and power claimed more than 60 per cent of the total outlay. This share had gone down to about 52 per cent in the Seventh Plan and in the Ninth Plan, to 33 per cent of the total outlay but the expenditure on power has increased continuously. Expenditure on agriculture and allied services increased from 4.8 per cent to 9.3 per cent during Fifth Plan to Ninth Plan.

The state income and per capita income reflect the overall performance of the economy, during a given period. Growth in the SDP largely depends on the trends in agriculture production, as agriculture is the largest contributor to SDP and has an overall impact on other sectors as well. Since the state income is subjected to wide fluctuations depending on the monsoons, the estimation of the growth of state income is a difficult job.

Table 1.3 reveals that over the plan era the growth trend was uneven. However, the NSDP increased during the plan period, except during three annual plans (1966-69) and the annual plan of 1991-92 when a negative trend was observed. The highest growth rate was observed in the Fourth Five-Year Plan (1969-74). The NSDP increased 15.6 per cent in 1990-91 on 1989-90 prices and declined to 4.7 per cent in 1990-92 as compared to 1990-91. The per capita income followed the same trend. However, the overall growth rate in the SDP during the period 1961-90 was 4.2 per cent per annum while the growth rate in per capita income was only 1.6 per cent per annum during the same period.

Table 1.3: Compound Growth Rate of Net State Domestic Product and Per Capita Income

Period	Net State Domestic Product	Per Capita Income at 1980-81 Price
III Plan (1950-66)	1.36	(-) 0.98
Annual Plans (1966-69)	(-) 0.77	(-) 3.02
IV Plan (1969-74)	7.08	3.81
V Plan (1974-79)	5.18	2.22
VI Plan (1980-85)	5.94	3.01
VII Plan (1985-90)	7.06	4.47
Annual Plans (1989-90) to (1990-91)	15.60	-
(1990-91) to (1991-92)	(-) 4.73	1.65
Long Term (1961-1990)	4.22	1.57
VIII Plan (1992-97)	7.00	4.80

Source: Eighth Five Year Plan 1992-97: Government of Rajasthan, Planning Department, p. 9.

Structure of the Economy

The structure of the economy showed a gradual shift from primary sector to other sectors. By observing the data, we find that the economy of the state is being transformed from an agricultural base to industrial base. The share of primary sector to GDP was 62.2 per cent in 1970-71, which decreased to 30.2 per cent in 1999-2000. The share of secondary sector to GDP increased

from 12 percent in 1970-71 to 27.6 per cent in 1999-2000. In the same period, the share of tertiary sector to GDP increased from 25.8 per cent to 42.3 per cent. Thus, the share of primary sector has been falling while the shares of secondary and tertiary sectors have been increasing.

Table 1.4: Structure of the Economy

Year	Primary Sector	Secondary Sector	Tertiary Sector	Total
1954-55	57.02	22.32	20.66	100
1960-61	61.23	20.29	18.48	100
1970-71	62.22	11.99	25.79	100
1974-75	56.39	16.32	27.29	100
1979-80	49.64	16.41	33.95	100
1980-81	52.26	18.03	29.71	100
1983-84	57.02	17.38	25.60	100
1984-85	54.33	16.60	29.07	100
1985-86	50.30	19.11	30.59	100
1988-89	49.96	17.67	32.37	100
1989-90	46.86	18.55	34.39	100
1990-91	50.75	16.54	32.71	100
1991-92	47.23	17.99	34.78	100
1998-99	34.30	25.50	40.20	100
1999-2000	30.20	27.60	42.30	100

Source:

- (i) 21 Year of Rajasthan Economy, (p. 184), DES Rajasthan, Jaipur, 1975.
- (ii) Statistical Abstract, Rajasthan (Various years), DES Rajasthan, Jaipur
- (iii) Eighth Five Year Plan 1992-97: Government of Rajasthan, Planning Department.

Agricultural Planning in the State

The objects of agricultural planning at national level as well as state level have been similar. Important objectives of agricultural planning in the state are:

- (1) To implement land reforms forcefully, to bring more and more land under cultivation in the arid and semi arid district, to raise per hectare yield through intensive application of agricultural inputs such as irrigation, improved seeds. Fertilizers, plant protection measure etc. and ultimately to bring about increased agricultural production.
- (2) To generate additional employment opportunities and to provide scope to increasing the income of peasant and poor sections in the village.
- (3) The other important objective is reducing the number of people working on land. The surplus labour on land may be shifted to industries, mines and other economic activities.
- (4) To reduce inequalities of income in rural areas.

All these objectives of agriculture planning are being followed in all the plans of the state, but in practice, agricultural planning has achieved only increase in agricultural production. Other objectives either have been ignored or have not been achieved.

Strategy Used in Planning for Agricultural Sector

To increase agriculture production and employment opportunities, the five year plan in the state are using strategies and programme such as expansion of irrigation facilities, high yielding varieties of seeds, fertilizers, pesticides, agricultural machinery and expansion of institutional credit etc. The object to increase the agriculture production has always been one of the aims of the plans in the state. In first five year plan the shift was towards balanced growth through the use of appropriate agricultural inputs. In third five year plan, the concept of Intensive Agricultural Development Programme (IADP) was introduced with package approach for selected area and selected crops.

Annual plan (1966-69) witnessed the beginning of the Green Revolution by introduction of high yielding varieties. This approach continued during the fourth five year plan.

In the fifth five year plan, integrated area approach was adopted where planning of various agricultural inputs was accompanied by the concept of on-farm development and improved crop management practices through training and visit (T&V) system. In the sixth plan, input programming of minimize adverse atmospheric effects on agriculture production was further accelerated. In seventh plan (1985-90), it was envisaged to increase irrigated area and proper management of irrigated in existing areas, to increase use of improved seeds, fertilizers and pesticides; to adopt dry farming practices and to cover left out area under extension machinery. In annual plans (1990-92) priorities were identified and thrust programmes for increasing the production of selected crops in identified areas were introduced. Land reclamation programme was undertaken on large scale through National Watershed Development Programme and Ravine Reclamation Programme. Another significant feature had been distribution of inputs through mini kits to small and marginal farmers. Besides, attempts were also made to ensure flow of the new technology to the weaker sections. As a result of these efforts, the state could achieve a new buoyancy in agricultural production.

In Eighth plan (1992-97), the agriculture sector also continues to be the focus of attention; specific attention has been paid to the following programme:

- (i) **Land Management:** (a) Adoption of dry farming technologies to increase agriculture production in rainfed areas; (b) adoption of agro/social forestry programme extensively for development of waste

land; (c) reclamation of degraded lands; (d) amelioration of soil health through use of bio-fertilizer and green manure.

- (ii) **Water Management:** Strategies proposed to be adopted for efficient use of water consist of (a) water budgeting and crop planning is command area of all irrigation project; (b) crop diversification to attain higher return per unit of water used. Crop diversification includes growing low water duty crops i.e., pulses, oilseeds, etc. expansion of area under soybean and sunflower etc. and promoting oilseed-cum-soil stabilizer crop i.e. Tumba in western part of the state; (c) judicious use of ground water through sprinkle or drip irrigation system; (d) ground water exploitation in white zone through tube wells etc.

In the ninth plan, with all above programme, government set up agro-based industry in rural areas so that they can reduce the pressure of population on land. To bring about economic equality and social justice in rural areas, the strategy of land reform is being used in the state.

By analyzing the data we find that total expenditure on agriculture in each plan has been increasing continuously. Table 1.5 indicates the pattern of investment on agriculture in various five year plans.

Table 1.5: Pattern of Investment on Agriculture During Plans in Rajasthan

(Rs. In Crores)

Plan	Total Plan Expenditure (Rs in crore)	Expenditure on Agriculture and Allied Services, Irrigation and Flood Control (Rs.)	Per Cent of Total Plan Expenditure
I Plan (1951-56)	54.2	33.9	62.7
II Plan (1956-61)	102.7	34.2	33.3
III Plan (1961-69)	212.7	100.3	47.2
Annual Plans (1966-69)	136.8	56.6	47.2
IV Plan (1969-74)	308.8	115.5	37.4
V Plan (1974-79)	857.6	302.6	35.3
Annual Plans (1989-90) to (1990-91)	290.2	91.9	31.7
VI Plan (1980-85)	2120.2	643.6	30.4
VII Plan (1985-90)	3106.2	852.4	27.4
Annual Plan (1990-91)	975.6	245.4	25.2
Annual Plan (1991-92)	1184.4	313.4	26.5
VIII Plan (1992-97)	11500.0	2948.3	24.6
IX Plan (1997-02)	27444.0	4570.0	17.3

Source:

- (i) Five year Plans: Fro Fist to Seventh: Govt. of Rajasthan, Planning Department, Jaipur.
- (ii) Eighth Five Year Plan 1992-07: Government of Rajasthan, Planning Department.
- (iii) Ninth Five Year Plan 1997-02: Government of Rajasthan, Planning Department.

The traditional agricultural practices are gradually being replaced by new technology. Advanced farm practices and green revolution are taking hold in the state. In 1960-61, the new technique of agriculture was known as the 'Package Programme' because of the package of improved practices recommended under it later the High Yielding Varieties Programme was added to the IADP and the strategy was extended to cover the entire state of Rajasthan. This strategy is called New Agricultural Technology or seed fertilizer-water technology or 'Green Revolution'. The new agricultural technology consists of those resources such as water, improved seeds, fertilizers and pesticides which are produced outside the agricultural sector. The HYVP was taken up for rice, wheat, bajra, maize and rapeseed and mustard. The new agricultural technology aims at raising farm output through the use of the inputs.

Agricultural Labour Planning

Agricultural labour planning mainly considers the problems of economically and socially backward section of rural society who are engaged in agriculture. The planning also considers the working conditions of the agricultural laborers such as hours of work, weekly holiday, payment of prescribed wages, welfare of labourers and their families. Workers in the agricultural sector are divided into three main categories:

- (i) Cultivators;
- (ii) Agricultural labor, and
- (iii) Workers engaged in forestry, fishing and livestock.

The analysis concerned with agricultural labour which is basically unskilled and unorganized and has little for its livelihood other than personal labour persons whose main source of income is employment fall in this category. It consists of two sub-categories (a) land less agricultural labour, and (b) very small cultivators whose main source of earnings is wage employment because of their small and sub-marginal holdings. Landless labor again can be classified into two broad categories: (a) Permanent labour attached to cultivating household and (b) casual labour. The very small cultivators can again be divided into three sub-groups: (i) cultivators, (ii) share croppers, and (iii) lease holders. All these categories of workers constitute agriculture workers.⁸

Table 1.6 reveals that number of cultivators in Rajasthan was 70.6 lakh persons in 1961 (73.7 per cent of labour force), which increased to 105 lakh person in 2001. Number of agricultural labourers was 4.0 lakh in 1961 which increased to 19.0 lakh in 2001. Agricultural labourers increased 375 times between 1961 and 2001. Persons engaged in livestock rearing, forestry, fishing and plantation etc. increased 47 per cent between 1961 and 2001 i.e. from 1.7 lakh in 1961 to 3.0 lakh in 2001. The figures indicate that there was a sharp increase in the number of agricultural labourers.

⁸ Report of National Commissioner on Labour, 1969.

Table 1.6: Value Added by Each Sector of the Economy to Net State Domestic Product: Rajasthan (Per Cent)

Year	Primary Sector*	Secondary Sector	Tertiary Sector	Total
1970-71	62	12	26	100
1974-75	57	16	27	100
1979-80	50	16	34	100
1980-81	52	18	30	100
1983-84	57	17	26	100
1984-85	54	17	29	100
1985-86	50	19	31	100
1988-89	50	18	32	100
1989-90	47	18	35	100
1990-91	51	16	33	100
1991-92	47	18	35	100
1995-96	35	27	38	100
1996-97	39	24	37	100
1997-98	35	26	39	100
1998-99	35	25	40	100
1999-2000	32	26	42	100
2000-2001	30	26	44	100

* (Includes income from mining also)

Source:

- (i) Eighth Five Year Plan, 1992-97, P-9 and 10, Government of Rajasthan.
- (ii) Budget Study 2002-03 DES, Rajasthan, Jaipur.

Rural population of Rajasthan was 168.8 lakh in 1961 which increased to 418 lakh in 2001. Between 1961 and 2001, the rural population registered an annual growth rate of 2.4 per cent while the growth in number of agricultural labourers registered at 4.2 per cent per annum. This shows that agricultural labourers are increasing at a faster rate than rural population. Marginal and very small farmers are joining the rank of agricultural labourers. According to 2001 census, total labour force of the state registered 180.0 lakh persons. Out of which person engaged in agricultural activities registered 127.0 lakh (70.6 per cent). Number of cultivators registered 105.0 lakh persons (58.8 per cent), agricultural labourers registered 13.9 lakh persons (10 per cent) and other registered 3.0 lakh persons (1.8 per cent).

Minimum Wage Act was passed in 1948. The act was extended to cover agricultural labour but still it has not brought large sections of agricultural labourers within the ambit of the act is implemented in the state. Though the act is implemented in the state the machinery for the fixation and enforcement of minimum wages is not working efficiently. Thus the act has been a dead letter in the state. Minimum wages in agriculture have not been revised over long periods. The actual wages (Rs. 60 in the labour market) are higher than the minimum wage (Rs. 32 at present) in the state. The machinery for enforcement is hopelessly inadequate to cope with the task of effective implementation. Other difficulties in the implementation of the Act arise from poverty and illiteracy of agricultural labour, absence of knowledge of the existence of legislation, scattered nature of agricultural farms, casual nature of employment and unorganized character of agricultural labour etc.

Central as well as the state government have launched special schemes to improve the economic conditions and employment opportunities of small

farmers, marginal farmers and agricultural labourers. These schemes are: small farmers and Agricultural Labourers (SFDA) 1969-70, FFWP (1977), small farmers and agricultural labourers (SFAL) scheme, Apana Gaon Apana Kam (AGAK) 1991, IRDP (1978-79), JRY (1989) etc. above agencies were carrying on the task of providing employment to rural people and are also engaged in improving the economic conditions of agricultural labour.

The Bonded Labour System (Abolition) Act 1976 prohibits the system of bondage in the country. After the identification of bonded labour, they are released and assisted Rs. 6250 per head (sharable 50:50 between central and state governments) for rehabilitation. During the sixth plan (1980-85) 6.7 thousand bonded labourers were identified and released. Out of them 2.6 were fully rehabilitated and 2.6 were partially benefited. But the fact is that the bonded labourers are not being paid proper attention because state and district authorities have failed to provide sufficient subsistence allowance during the interviewing difficult period of release and rehabilitation. Secondly, nearly 50 per cent of freed bonded labours depend upon borrowing from money lenders or others which again place them in danger of going back to bondage because they have no capacity to repay the loans. While planning for agricultural labourers proper attention should be given to bonded labour.

Value Added by Agriculture to State Domestic Product

Value added by agriculture to state domestic product is a crucial indicator of the role that agriculture plays in economic development of a state. As the state rides wheels of progress, the relative contribution of agriculture in the state Domestic Product declines with the state becoming more and more prosperous. The expanding non-agricultural sector divert surplus manpower from agriculture to industry and the improvements in agriculture enable a

smaller number of people to produce for a large people. Progressive agricultural sector means a higher level of national income and consequently a higher level of economic development (Johnson and Mellor).

State domestic product is a sum of contributions made by various activities such as cultivation of land, animal husbandry, small and large manufacturing industries, trade, transport and government services. Since 1954-55, share of each sector of the economy in state domestic product is changing. It may be smaller or larger but it is steady. The value added by agriculture sector to state domestic product is subjected to wide fluctuations depending on monsoon conditions and prices of agricultural products. Since 1970-71, it has been seen that enough conditions prevailed in every year in the state, except 4 years viz. 1973-74, 1975-76, 1976-77 and 1983-84. Studies reveal that one good year is followed by two drought years. The frequency of drought has been increasing continuously in the state. Since 1977-78, drought conditions have prevailed almost every year, except for one or two years, in the state.⁹

Table 1.7 reveals that the value added by primary sector which stood at 62 per cent in 1970-71 has declined to 30 per cent in 2000-01 while the value added by secondary and tertiary sectors which were 12 and 26 per cent respectively in 1970-71 and risen to 26 and 44 per cent respectively in 2000-01.

⁹ White paper on Economic Development of Rajasthan, 1991.

Table 1.7: Employment Generation by Agriculture in Rajasthan**(Lakh Number)**

Activity	1961	1971	1981	1991	2001
1. Cultivators	70.6 (73.7)	52.3 (65.0)	64.3 (61.6)	81.8 (58.8)	1.5 (58.0)
2. Agricultural Labourers	4.0 (4.2)	7.5 (9.3)	7.7 (7.4)	13.9 (10.0)	19 (11.0)
3. Livestock, Forestry Fishing, Hunting, Plantation and Orchards etc.	1.7 (1.8)	2.1 (2.6)	-	2.5 (1.8)	3 (1.7)
4. Total Number of Persons engaged in Agricultural Activities	76.2 (79.5)	61.8 (76.8)	72.0 (69.0)	98.3 (70.6)	127 (70.7)
5. Total Labour Force of Rajasthan	95.8 (100.0)	80.5 (100.0)	104.4 (100.0)	139.2 (100.0)	180 (100.0)
6. Total Population of Rajasthan	201.6	257.7	324.6	440.0	565.0

Note: Figures in parenthese are per cent of total labour force in the state.

Source:

- (i) For 1961, Figures: Basic Statistics, Rajasthan, 1969 DES, Jaipur.
- (ii) For 1971, Figures: Basic Statistics, Rajasthan, 1972 DES, Jaipur.
- (iii) For 1981 and 1991 figures: Some Facts About Rajasthan, 1992, DES, Jaipur.

Income Generation from Agriculture

The income of cultivator depends, to a great extant, on the productivity of the land which depends upon adoption of scientific and technical devices and improved agricultural practices, use of HYV seeds and fertilizers, harvest prices, and reduction in the pressure of population on agriculture.

The average level of agricultural income in Rajasthan is considerably low. An attempt is made here to prepare an estimate per hectare and per person income in agriculture. For this purpose, the data of agricultural income and total cropped area have been obtained from various sources of statistical information. The per hectare agricultural income is derived by dividing total agricultural income by total cropped area in a particular year while per person income in agriculture is devised by dividing total agricultural income by number of persons engaged in agriculture.

Per hectare (cropped area) agricultural income was Rs. 415 in 19970-71 which increased to Rs. 1098 in 1980-81 and to Rs. 10430.0 in 1999-2000. Low per hectare agricultural income is the outcome of low productivity. Increase productivity in agriculture has been attempted through adoption of scientific devices, HYV seeds and fertilizer, and reduction in the pressure of population on agriculture.

The per person per annum and per month agricultural income in Rajasthan was Rs. 1012 and Rs. 84 respectively in 1970-71 which increased to Rs. 20054 and Rs. 1671 respectively in 1999-2000. Table 1.8 shows an increasing trend in per hectare and per person agricultural income but, in fact, it is not so. Per hectare and per person agricultural income fluctuates with weather conditions and harvest prices. Unfavourable weather conditions and the harvest prices have an adverse effect on agricultural incomes. The fall in agricultural output hits small cultivators whose low-income increase their hardships. Income instability in agriculture means insecurity and uncertainty to the cultivators.

Table 1.8: Income Generation from Agriculture: Rajasthan

Particular	Unit	1970-71	1976-77	1980-81	1985-86	1990-91	1999-2000
1. Income from agriculture	Lakh Rs.	62533	144390	189553	357190	691587	2011602
2. total cropped area	Lakh Hec.	150.9	169.0	172.6	181.4	171.0	192.4
3. Income per Hectare	Rs.	415.0	855.0	1098.0	1969.0	4045.0	10,430
4. No. of Person engaged in Agriculture	Lakh No.	61.8	67.9	72.0	85.1	98.3	126.2
5. Income per cultivator	-	-	-	-	-	-	-
(i) Per annum	Rs.	1012.0	2127.0	2633.0	4197.0	7036.0	20,054
(ii) Per month	Rs.	84.0	177.0	220.0	350.0	586.0	1671

Source:

- (i) Statistical Abstract Rajasthan, 1972, 1979, 1989, DES, Rajasthan, Jaipur
- (ii) Some fact about Rajasthan, 1992, DES, Rajasthan, Jaipur.

Per hectare and per person agricultural income can be increased by mechanization of agriculture. There are three ways through which mechanization in agriculture can be brought about: (i) application of mechanical power right from the sowing to harvesting stage; (ii) rationalization of the application of science to phases of agricultural production; and (iii) universal irrigation or expansion of irrigation. Mechanization tends to raise per person productivity, while nationalization including irrigation tends to increase per hectare productivity. When both these factors are associated and applied together, the immediate results will be higher per person and per hectare productivity, which will solve the problem of low productivity and low income in agriculture.

Two pertinent questions relating to mechanization of agriculture in the state arise; first, will this be feasible in the heavily agrarian structure of the state? And second, will the cultivators of the state with their present financial resources be able to successfully attempt mechanization of agriculture? These are in fact, not feasible under the agrarian structure in the state. Small cultivators presently cannot invest huge sums. Mechanization will be possible only on big farms and it would be difficult to create big farms through consolidation. Mechanization of agriculture in the state can be possible only by stages. Credit and other facilities will have to be provided to the cultivators at low rate of interest for a longer period.

Briefly, it can be said that the importance of agriculture in overall economic development of the Rajasthan is borne out by the fact that it is the primary sector of the economy that provides the basic ingredients necessary for

existence. In an agrarian economy, agriculture thus plays a strategic role. Agriculture production must therefore, be increased rapidly to keep pace with population growth. Technical improvement is essential in agriculture for creating development in other sectors of the economy as well.

CHAPTER 2

CROPPING PATTERN AND INSTITUTIONAL CREDIT FLOW IN RAJASTHAN: A SURVEY

It is characterized by uneven economic and agricultural development in various regions. The introduction of the new yield raising seed-fertilizer technology in agriculture during the mid-1960s has led to a marked increase in the growth rate of agricultural output. This has been instrumental in the transformation of traditional household agriculture into commercially modern agriculture in some of the agriculturally developed states.

The differential adoption of the new seed-fertilizer technology in various parts of India has resulted in significant changes in cropping patterns and growth of agricultural output. Cropping pattern refers to the proportion of area under different crops at a point of time. A change in cropping pattern implies a change in the proportion of area under different crops. The aggregate cropping patterns of the country represented by the gross cropped area allocation among different crops is built upon the separate cropping patterns of individual farmers or groups of farmers within each village, district, state and country. No cropping pattern may be good and ideal for all times to come. Farmers allocate their land among alternative crops in order to maximize their expected return.

The state cropping pattern reflects the rational decisions of an aggregate of farmers, subject to technical and institutional constraints, including those imposed by the nature of subsistence farming practiced by the majority of farmers in India. Most subsistence farmers grow food grains crop to meet their families' requirement of food grains. The changes they are willing to make in

cropping patterns are conditioned by this requirement, along with their ability to undertake risks inherent in exclusively relying on returns from a single crop. Thus, there is a tendency on the part of farmers to stick to a stable cropping pattern in any given agro-climatic region. Farmers do not shift much from this position except to the extent dictated by price factors in adjusting increase in response to breakthroughs in agricultural production technology, such as using high-yielding crop varieties along with fertilizers, pesticides, insecticides and increase in irrigated area.

Cropping patterns differs from region to region. The cropping pattern of a region is guided by physical and technological factors. It is essential to divide the state into homogenous units or regions or zones for analysis cropping patterns.

Cropping Pattern in Rajasthan

In Rajasthan, a variety of field crops, vegetables, fruits and spices are grown owing to its diversified soil types and congenial agro-climatic conditions. Important crops grown for rabi in Rajasthan are wheat, barley, gram, mustard and rapeseed. These crops are mainly grown in the districts of Bharatpur, Alwar, Ganganagar, Jaipur, Pali, Sawaimadhapur, Dungarpur, Kota, Banswara, Bhilwara, Chittorgarh, and Jhalawar. Important crops of kharif are bajra, maixe, jowar, guar, rice, sesamum, moong, moth and urd. These crops are grown in almost all the districts of Rajasthan and particularly in the desert districts of the state such as Jodhpur, Jalore, Jaisalmar, Churu, Ganganagar, Nagaur, Pali, and Bikaner.

Table 2.1 reveals that area under food grain crops has been increasing continuously since the First Plan period. The area under food grains increased

from 90.2 Lakh hectares in 1955-56 to 134.8 Lakh hectares in 1998-99. The area of rice cultivation increased steadily up to the Fifth Plan period. Thereafter, it remained almost constant and varied between 1.3 to 2.0 Lakh hectares. The area under jowar declined by 50 per cent, 11.1 Lakh hectares during the First Plan to 6.1 Lakh hectares during 2001-2002.

The area under bajra was 33.1 Lakh hectares during the First Plan period, and increased to 51.1 Lakh hectares during Fourth Plan. Thereafter, it fluctuated between 39.5 Lakh hectares to 51.3 Lakh hectares. The area under wheat increased from 9.22 Lakh hectares during the First Plan to 18.7 Lakh hectares during Sixth Plan period. Thereafter, it increased to 27.7 Lakh hectares during 1998-99 and decreased to 26.5 and 22.9 in 1999-2000 and 2001-02 respectively.

The area of pulses increased from 24.6 Lakh hectares during First Plan period to 46.5 Lakh hectares during 1998-99. Thence, it decreased to 24.8 Lakh hectares during 1999-2000 and increased to 33.6 Lakh hectares during 2001-2002.

The area of 4.4 Lakh hectares of sesamum during the First Plan increased to 6.40 Lakh hectares during the annual plan after Third Plan. Thereafter it showed a declining trend and reached as low as 2.1 Lakh hectares during 1999-2000 following which it increased once again to 3.2 Lakh hectares during 2001-02.

The average area of groundnut of 0.4 Lakh hectares during First Plan period increased dramatically up to the annual plan after Third Plan to 2.6 Lakh hectares. Thereafter, it became almost static up to 1993-94. During 1998-99, the area increased, however, again it has shown a declining trend.

Table 2.1: Cropping Pattern in Rajasthan : Important Crops

[AREA : LAKH HECTARES/CROPPING PATTERN IN PERCENT]

CROPS	I PLAN		II PLAN		III PLAN		ANNUAL PLANS		IV PLAN		V PLAN		ANNUAL PLAN	
	1952-56		1956-61		1961-66		1966-69		1969-74		1974-79		1979-80	
	AREA	%	AREA	%	AREA	%	AREA	%	AREA	%	AREA	%	AREA	%
a. Cereals	65.6	56.0	75.2	54.6	81.4	54.4	85.0	55.0	91.1	55.7	81.5	48.4	87.2	53.3
(i) Rice	0.7	0.6	0.9	0.6	1.1	0.7	1.3	0.7	1.3	0.8	1.7	1.0	1.9	1.1
(ii) Jowar	11.1	9.5	10.2	7.4	11.3	7.6	10.8	7.0	10.7	6.5	7.8	4.7	8.5	5.2
(iii) Bajra	33.1	28.3	40.3	29.3	45.0	30.1	48.2	31.2	51.1	31.2	40.3	23.9	42.7	26.1
(iv) Wheat	9.2	7.9	11.8	8.6	11.6	7.8	11.3	7.3	14.6	8.9	17.8	10.6	20.7	12.7
b. Pulses	24.6	21.0	33.0	24.0	32.3	21.6	31.9	20.7	34.6	21.2	39.7	23.7	30.3	18.5
(i) Arhar	0.1	0.1	0.2	0.2	0.3	0.2	0.2	0.2	0.3	0.2	0.4	0.2	0.3	0.2
(ii) Gram	10.1	8.6	14.9	10.8	14.3	9.6	14.5	7.4	14.2	8.7	17.5	10.4	13.8	8.4
Foodgrains	90.2	77.0	108.2	78.6	113.7	76.0	116.9	75.6	125.7	76.9	121.4	72.1	117.5	71.8
c. Oilseeds	7.2	6.2	9.2	6.7	11.1	7.4	11.4	7.4	11.0	6.8	10.9	6.5	10.5	6.4
(i) Sesamum	4.4	3.7	4.8	3.5	5.7	3.8	6.4	4.1	5.0	3.0	3.7	2.2	3.2	1.9
(ii) Groundnut	0.4	0.3	0.8	0.6	1.8	1.2	2.6	1.7	2.3	1.4	2.9	1.7	2.9	1.8
(iii) Rapeseed & Musturd	1.6	1.4	2.5	1.8	2.7	1.8	1.9	1.2	3.0	1.8	3.1	1.7	3.5	2.1
Others	-	-	-	-	-	-	-	-	-	-	-	-	-	-
(i) Sugercane	0.2	0.2	0.2	0.2	0.4	0.3	0.3	0.2	0.4	0.2	0.5	0.3	0.3	0.2
(ii) Cotton	1.9	1.7	2.3	1.7	2.4	1.6	2.6	1.7	2.9	1.8	3.3	2.0	3.9	2.4
Total Cropped Area	117.1	100	137.7	100	149.6	100	154.5	100	163.5	100	168.4	100	163.7	100

Continued...

CROPS	VI PLAN		VII PLAN		1991-92		1992-93		1993-94		1998-99		1999-2000		2001-2002	
	1980-85		1985-90		AREA	%	AREA	%	AREA	%	AREA	%	AREA	%	AREA	%
	AREA	%	AREA	%												
a. Cereals	91.0	50.3	89.1	52.7	84.6	46.8	94.0	46.6	82.8	44.8	88.3	41.3	84.8	44.0	93.8	45.1
(i) Rice	1.5	0.8	1.3	0.7	1.4	0.8	1.4	0.7	1.4	0.8	1.7	0.8	2.0	1.0	1.4	0.7
(ii) Jowar	9.5	5.3	10.0	6.0	7.1	3.9	7.8	3.9	6.6	3.6	5.4	2.5	5.6	2.9	6.1	2.9
(iii) Bajra	48.3	26.7	48.3	28.4	46.0	25.4	50.0	24.8	43.5	23.5	41.8	19.5	39.5	20.5	51.3	24.7
(iv) Wheat	18.7	10.3	17.3	10.3	17.8	9.8	22.5	11.2	20.1	10.9	27.7	12.9	26.5	13.7	22.9	11.0
b. Pulses	35.1	19.4	36.8	17.0	28.3	15.6	34.4	17.1	33.2	18.0	46.5	21.7	24.8	12.9	33.6	16.2
(i) Arhar	0.3	0.2	0.2	0.1	0.2	0.1	0.2	0.1	0.2	0.1	0.3	0.1	0.3	0.2	0.2	0.1
(ii) Gram	16.5	9.1	13.3	7.7	10.3	5.7	14.5	7.2	12.2	6.6	28.2	13.2	9.8	5.1	9.7	4.7
Foodgrain	126.1	69.7	118.6	70.0	112.6	62.4	128.4	63.7	116.0	62.7	134.8	63.0	109.6	57.0	127.4	61.3
c. Oilseeds	14.9	8.2	19.1	11.5	35.5	19.6	33.5	16.6	36.0	19.6	43.1	20.1	36.8	19.0	31.1	15.0
(i) Sesamum	4.2	2.3	3.5	2.0	6.9	3.8	4.5	2.2	5.2	2.8	2.4	1.1	2.1	0.5	3.2	1.5
(ii) Groundnut	2.0	1.1	2.3	1.4	2.5	1.4	2.5	1.2	2.7	1.4	3.3	1.5	2.8	1.5	2.4	1.2
(iii) Rapeseed & Musturd	7.0	3.9	10.1	6.1	22.2	12.3	22.2	11.0	22.2	12.3	23.2	10.8	25.0	13.0	17.6	8.5
Others	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
(i) Sugercane	0.3	0.2	0.2	0.1	0.3	0.2	0.2	0.1	0.2	0.1	0.2	0.1	0.2	0.1	0.1	0.0
(ii) Cotton	3.8	2.1	3.4	2.0	4.8	2.3	4.8	2.4	5.2	2.8	6.5	3.0	5.8	3.0	5.1	2.5
Total Cropped Area	181.0	100.0	169.3	100.0	180.9	100.0	201.7	100.0	184.9	100.0	214.0	100.0	192.9	100.0	208.0	100.0

Sources :

Statistical Abstract, Rajasthan. [Various Years] : DES, Rajasthan, Jaipur

Agricultural Statistics Rajasthan. 1991-92 DES Rajasthan, jaipur, 1993

Vital Agriculture Statistics, 1993-94 Directorate of Agriculture. Rajasthan. Jaipur 1995

Agricultural Statistics Rajasthan. 2001-02 DES Rajasthan, jaipur

The area under rapeseed and mustard increased steadily up to Fifth Plan period from 1.6 Lakh hectares during First Plan to 3.1 Lakh hectares during the Fifth Plan. After this, there was a jump to 7.0, 10.1, 22.2 Lakh hectares during the Sixth and Seventh Plan Periods and 1991-92, respectively. Thereafter, it increased to 25 lakh hectares in 1999-2000 and decreased to 17.6 Lakh hectares during 2001-02.

The area under sugarcane was almost constant from the First Plan period to 1999-2000. The area under cotton increased steadily from 1.9 Lakh hectares in First Plan period to 3.8 Lakh hectares during Sixth Plan period. There was a slight decrease in area during Seventh Plan period after which it again increased to 6.5 Lakh hectares during 1998-99 and decreased to 5.8 Lakh hectares and 5.1 Lakh hectares during 1999-2000 and 2001-02 respectively.

Table 2.2 reveals that food grains occupied a dominating position in the cropping pattern of the state. But in percentage terms, it declined from 77 per cent to 56.8 per cent of gross cropped area between 1955-56 and 1999-2000. Of gross cropped area, nearly 56 per cent was under cereals and 21 per cent under pulses in 1951-56. The area under cereals and pulses declined from 56 per cent and 21 per cent in 1951-56 to 44 per cent and 12.8 per cent respectively in 1999-2000.

Table 2.2: Cropping Pattern in Rajasthan: Crop Groups

[AREA : IN PERCENT]

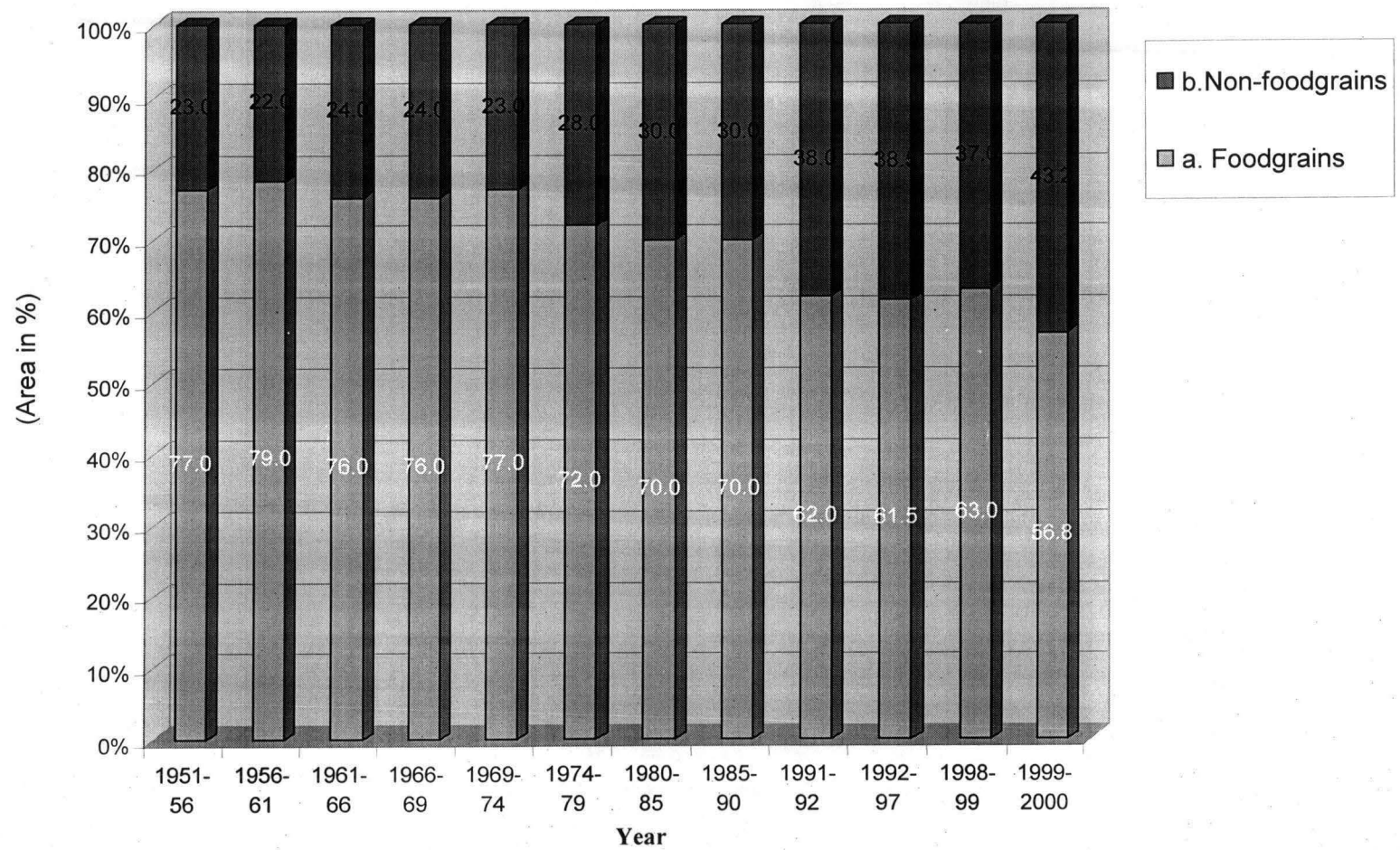
CROP GROUP	AREA UNDER PRINCIPAL CROPS IN PERCENT											
	I PLAN	II PLAN	III PLAN	ANNUAL PLANS	IV PLAN	V PLAN	VI PLAN	VII PLAN		VIII PLAN		
	1951-56	1956-61	1961-66	1966-69	1969-74	1974-79	1980-85	1985-90	1991-92	1992-97	1998-99	1999-2000
a. Foodgrains	77.0	79.0	76.0	76.0	77.0	72.0	70.0	70.0	62.0	61.5	63.0	56.8
(i) Cereals	56.0	55.0	54.0	55.0	56.0	48.0	50.0	53.0	47.0	42.0	41.3	44.0
(ii) Pulses	21.0	24.0	22.0	21.0	21.0	24.0	20.0	17.0	15.0	19.6	21.7	12.8
b. Non-foodgrains	23.0	22.0	24.0	24.0	23.0	28.0	30.0	30.0	38.0	38.5	37.0	43.2
(i) Oilseeds	6.0	7.0	7.0	7.0	7.0	7.0	8.0	12.0	-	19.8	20.1	18.9
(ii) Sugarcane	0.2	0.2	0.3	0.2	0.2	0.3	0.2	0.1	0.2	0.1	0.1	0.1
(iii.) Cotton	1.7	1.7	1.6	1.7	1.8	2.0	2.4	2.0	2.3	2.4	3.0	3.0
c. Total Area Cropped	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Sources:

- [1.] Agricultural Statistics, Rajasthan. 1991-92 DES. Rajasthan, Jaipur 1993
- [2.] Agricultural In Rajasthan : A Statistical Hand Book Department of Agriculture, Rajasthan, Jaipur 1991.
- [3.] Vital Agriculture Statistics. 1993-94, Directorate of Agriculture, Rajasthan, Jaipur 1995
- [4.] Statistical Abstract. Rajasthan. DES Jaipur 2001

Fig 2.1

Cropping Pattern in Rajasthan



The area under non-food grains increased from 23 per cent in 1951-56 to 43.2 per cent in 1999-2000. The area under oilseeds and cotton increased from 6 and 1.7 per cent in 1951-56 to 18.9 and 3.0 per cent respectively in 1999-2000. Among the commercial crops, oilseeds are the most important and covered 18.9 per cent of the gross cropped area in 1999-2000. The shift in crops pattern from food grains to non-food grains, particularly oilseeds and cotton, was mainly due to higher price of commercial or cash crops.

The cropping pattern of the state is changing continuously – from food crops to cash or commercial crops. Change in cropping pattern of the state occurred due to the adoption of HYV seeds, increase in irrigation facilities and use of fertilizers, land development and water management programme, and adoption of plant protection.

There are however, still drawbacks in the cropping pattern of the Rajasthan. One, there is a low proportion of area under cash crops such as oilseeds (18.9 per cent of gross cropped area), cotton (3.0 per cent of GCA), sugarcane (0.1 per cent of GCA) and a high proportion of area under food grains (57 per cent of GCA) in 1999-2000. For another, there is the lack of capital investment in agriculture and of technical know-how.

Production and Productivity of Major Crops in Rajasthan

Agricultural planning is process of systematic channelisation of agricultural inputs for a balanced agricultural development in the different agricultural zones of the state. In the agricultural sector, stagnation has been broken by land reforms and the new agricultural strategy. The achievements of Agricultural planning can be appreciated through the progress made in the fields of land development, high yielding varieties, irrigation, fertilizers, plant

protection and production and productivity etc. “Productivity of each crop has been computed by dividing the total production of particular crop by the total area under respective crop.”

Table 2.3 reveals production of crop groups and individual crops, during plan periods. Table reveals that production of food grains crops has been increasing continuously from First Plan period to Ninth Plan period. Thereafter, it decreased 1.26 Lakh tonnes during Seventh Plan period and increased during Eighth and Ninth Plan periods. Production of jowar varied between 2.95 Lakh tonnes to 4.21 Lakh tonnes from First Plan period to Sixth Plan period. It decreased from 4.21 Lakh tonnes during Sixth Plan to 1.94 Lakh tonnes during Ninth Plan.

The production of bajra was 7.47 Lakh tonnes during First Plan period, increased to 15.78 Lakh tonnes during Fourth Plan. Thereafter, it fluctuated and varied between 9.66 to 19.96 lakh tones during Fifth plan to Eighth Plan periods then it increased to 20.33 lakh tones during Ninth Plan period. Production of wheat increased from 8.79 lakh tones during First Plan period to 54.80 lakh tones during Ninth Plan. The production of pulses increased from 7.60 lakh tones during First Plan period to 18.8 lakh tones during Ninth Plan period. It decreased in Third and Seventh Plan periods.

The production of oilseeds increased continuously from 2.09 lakh tones during First Plan period to 39.9 lakh tones during Eighth Plan period, thereafter it decreased to 39.5 lakh tones during Ninth Plan period. The production of rapeseed and mustard increased form First Plan period to Ninth Plan period and production of groundnut also increased during plan period. It only decreased in Sixth Plan period.

Table 2.3: Production of Major Crops in Plan Period

(Lakh Tonnes / Lakh Bales)

CROPS	I	II	III	IV	V	VI	VII	VIII	IX
A. CEREALS	32.38	33.67	37.06	50.56	52.43	65.27	73.80	97.30	115.90
I. Rice	0.73	0.76	0.88	1.18	2.02	1.62	1.26	1.57	2.00
ii. Jowar	3.80	3.01	3.41	3.83	2.95	4.21	3.40	2.55	1.94
iii. Bajra	7.47	8.15	10.12	15.78	9.66	14.76	13.47	19.96	20.33
iv. Wheat	8.79	10.57	10.22	17.28	23.79	30.70	35.19	52.99	64.80
B. PULSES	7.60	12.74	10.52	12.95	17.94	14.66	11.60	18.80	18.80
I. Arhar	0.03	0.06	0.11	0.15	0.14	0.14	0.11	0.12	.-na.-
ii. Gram	5.18	9.23	6.90	8.74	0.22	10.97	9.07	10.15	.-na.-
Foodgrains	39.98	46.40	47.57	63.51	70.36	79.94	85.30	116.10	134.30
C. OILSEEDS	2.09	2.28	2.56	3.72	4.43	8.48	18.50	39.90	39.50
I. Sesamum	0.90	0.71	0.58	0.60	0.54	0.53	0.46	0.75	0.43
ii. Groundnut	0.27	0.44	0.89	1.34	1.85	1.29	1.78	2.23	2.96
iii. Rapeseed & Musturd	0.60	0.84	0.87	1.55	1.70	5.34	9.62	20.75	21.21
D. OTHERS	-	-	-	-	-	-	-	-	-
I. Sugarcane	4.48	6.91	7.54	12.82	21.49	13.76	7.20	11.30	10.00
ii. Cotton	1.31	1.63	1.72	2.62	4.31	4.77	9.90	13.00	15.30

Sources :

1. Tenth five Year Plan [2002-2007], Govt. Of Rajasthan. Jaipur.

2. 50 Years Of Agricultural Development In Rajasthan, Directorate Of Agriculture, Rajasthan, Jaipur.

The production of cotton increased steadily from 1.31 lakh bales during First Plan period to 4.77 lakh bales during Sixth Plan. Thereafter, it increased to 15.3 lakh bales during Ninth Plan period. The production of sugarcane increased from 4.48 lakh tones during First Plan period to 21.49 lakh tones during Fifth Plan period. After that it decreased to 13.76 and 7.2 lakh tones during Sixth and Eighth Plan periods respectively. The increased in Eighth Plan period and decreased during Ninth Plan period.

Table 2.4 reveals productivity of crop groups and individual crops, during plan period. Table reveals that productivity of foodgrains decreased from 443 kg/ha during First Plan to 414 kg/ha during Annual plan. Thereafter, it increased from Fourth Plan period to Ninth Plan period (505 kg/ha to 1084 kg/ha). The productivity of cereals increased continuously from First Plan to Fourth plan. It decreased only Second Plan and annual plan (1966-69) periods.

Productivity of rice of 1081 kg/ha during First Plan decreased and fluctuated between 576 to 929 kg/ha up to Fourth Plan periods. Thereafter productivity increased but varied between 1014 kg/ha to 1201 kg/ha during Fifth to Eighth Plan periods. Productivity of jowar fluctuated between 294 kg/ha to 445 kg/ha during First to Eighth Plan periods and productivity of bajra also fluctuated between 202 kg/ha to 428 kg/ha during First to Eighth Plan periods. Productivity of wheat increased continuously from 953 kg/ha during First Plan to 2530 kg/ha during Ninth Plan periods. It decreased only during Third Plan period.

Table 2.4: Productivity Under Crops in Plan Period

[Yield In Kg/Hect]

CROPS	I	II	III	Annual Plan	IV	V	VI	VII	VIII	IX
A. CEREALS	493	448	455	453	555	643	718	846	1160	1307
I. Rice	1081	859	829	576	929	1201	1066	1014	1076	.-na.-
ii. Jowar	342	294	306	297	359	377	445	351	383	.-na.-
iii. Bajra	226	202	224	214	309	240	306	278	428	.-na.-
iv. Wheat	953	1141	878	994	1183	1351	1642	2053	2354	2530
B. PULSES	309	386	325	309	374	450	418	393	570	528
I. Arhar	293	299	406	348	507	379	430	495	530	.-na.-
ii. Gram	512	619	482	605	604	768	665	702	686	767
Foodgrains	443	429	418	414	505	580	634	731	995	1084
C. OILSEEDS	289	247	231	199	337	406	537	732	1095	1013
I. Sesamum	206	149	102	88	121	140	125	126	175	.-na.-
ii. Groundnut	702	556	487	390	579	639	651	753	901	.-na.-
iii. Rapeseed & Mustard	369	338	328	307	518	540	758	875	862	861
D. OTHERS	-	-	-	-	-	-	-	-	-	-
I. Sugarcane	21094	22013	19142	13656	33565	41805	40246	45820	50000	50000
ii. Cotton	116	121	122	129	155	224	215	386	490	432

Sources :

1. Tenth five Year Plan [2002-2007], Govt. Of Rajasthan. Jaipur.
2. 50 Years Of Agricultural Development In Rajasthan, Directorate Of Agriculture, Rajasthan, Jaipur.

The productivity of pulses remained almost constant during First Plan to Seventh plan. It increased to 570 kg/ha during Eighth Plan period and decreased to 528 kg/ha during Ninth Plan period. The productivity of oilseed decreased from 289 kg/ha during First Plan to 199 kg/ha during annual plan (1966-69) periods. Thereafter it increased from 337 kg/ha during Fourth Plan period to 1095 kg/ha during Eighth Plan period and decreased to 1013 kg/ha during Ninth Plan period.

The productivity of sesamum showed great fluctuation during the last 50 years. It was highest at 206 kg/ha in the First Plan and lowest in the annual plan at 88 kg/ha. The average productivity of groundnut of 702 kg/ha in the First Plan has shown a declining trend up to the annual plans (1966-69), it started increasing afterwards from 579 kg/ha in Fourth Plan to 901 kg/ha in Eighth Plan period. The productivity of rapeseed and mustard remained constant at around 300 kg/ha up to annual plan. Thereafter, it got a quantum jump to 518 kg/ha in IV plan, 758 kg/ha in Sixth Plan, 875 kg/ha in Seventh plan. Again, it became static at around 900 kg/ha in later plan periods.

The productivity of cotton increased steadily from 116 kg/ha in First Plan to 155 kg/ha in Fourth Plan, 224 kg/ha in Fifth Plan, 490 kg/ha in Eighth Plan. Thereafter, again it declined to 432 kg/ha in Ninth Plan period. The productivity of sugarcane doubled during last 50 years. It was 21094 kg/ha during First Plan and became 50,000 kg/ha during Ninth Plan period.

Trends in Area, Production and Productivity

Table 2.5 reveals year wise trends in area, production and productivity of crop groups and individual crops. The data reveal that substantial progress has been made in raising area under crops, the level of agricultural production and productivity of land.

Table 2.5: Trends In Area, Production And Productivity

[Area : Lakh Hectares, Production : Lakh Tones/Lakh Bales : Productivity : Kg/Ha]

Particulars	1952-53			1966-67			1967-68			1970-71			1980-81		
	Area	Prod.	Prov.	Area	Prod.	Prov.	Area	Prod.	Prov.	Area	Prod.	Prov.	Area	Prod.	Prov.
(A.) Cereals	61.0	28.9	474	79.6	33.4	420	84.3	35.7	473	92.6	70.4	763	92.0	53.3	578
I. Rice	0.7	0.4	639	1.0	0.7	659	0.8	0.2	275	1.2	1.1	1126	1.7	1.5	884
ii. Bajra	30.9	6.1	196	45.6	7.3	161	50.2	12.3	245	51.4	26.8	521	50.3	11.4	225
iii. Maize	4.7	2.8	598	6.5	6.5	918	7.4	6.1	829	7.6	9.3	1226	9.0	7.9	873
iv. Wheat	7.7	8.3	1075	10.7	10.1	946	9.6	8.7	907	14.8	19.5	1320	16.4	23.9	1464
(B.) Pulses	19.4	5.0	421	30.1	12.0	399	30.8	7.9	256	36.2	17.8	491	31.5	11.7	371
I. Gram	6.6	3.6	538	13.8	9.2	667	11.2	5.2	463	16.2	8.9	739	12.3	8.5	697
(C.) Total Foodgrains	80.3	33.9	421	109.7	45.4	414	115.2	43.6	379	128.8	88.4	687	123.5	65.0	526
(D.) Oilseeds	5.4	1.3	248	8.1	1.7	212	12.3	2.0	163	10.5	3.9	511	10.5	3.9	369
I. Sesamum	3.5	0.7	192	4.2	0.3	61	7.3	0.6	87	5.0	1.1	230	4.3	0.3	79
ii. Groundnut	0.3	0.1	448	1.0	0.5	494	2.0	0.8	381	2.1	1.4	665	2.1	0.9	405
iii. Rapeseed & Mustard	0.8	0.3	333	2.0	0.8	367	2.5	0.5	216	2.5	2.5	972	3.6	2.5	685
(E.) Others	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
I. Sugercane	0.2	4.1	22246	0.4	10.0	24380	0.3	3.9	12200	0.4	12.3	32770	0.3	11.6	39500
ii. Cotton	1.5	1.0	124	0.2	1.5	130	2.5	1.8	133	2.3	2.8	183	3.6	3.9	185

Continued...

Particulars	1990-91			1991-92			1992-93			1998-99			1999-2000		
	Area	Prod.	Prov.	Area	Prod.	Prov.	Area	Prod.	Prov.	Area	Prod.	Prov.	Area	Prod.	Prov.
(A.) Cereals	89.7	92.2	1027	84.4	70.3	836	94.0	100.2	1067	88.3	104.9	1188	84.8	97.9	1155
I. Rice	1.2	1.4	1183	1.4	1.8	1286	1.4	1.8	1234	1.7	2.1	1235	2.0	2.5	1250
ii. Bajra	48.6	24.9	513	46.0	10.7	233	50.0	29.0	580	41.8	18.0	431	39.5	13.0	330
iii. Maize	9.8	13.0	1324	9.5	7.7	811	9.5	10.1	1058	9.5	10.2	1074	9.3	9.7	1043
iv. Wheat	18.1	43.1	2375	17.8	44.8	2517	22.5	51.5	2287	27.7	68.8	2484	26.5	67.3	2540
(B.) Pulses	36.8	17.3	467	28.2	9.0	319	34.4	14.6	424	46.4	24.4	526	24.8	8.9	360
I. Gram	16.5	10.1	612	10.3	6.8	660	14.5	7.9	548	28.2	20.7	734	9.8	6.8	694
(C.) Total Foodgrains	126.5	109.4	864	112.6	79.3	704	128.4	114.8	894	134.7	129.3	960	109.6	106.8	975
(D.) Oilseeds	30.7	23.5	766	35.5	27.0	761	33.5	25.4	758	43.1	38.2	886	36.4	34.1	937
I. Sesamum	5.8	1.9	324	6.9	1.2	174	4.5	1.1	229	2.4	0.3	125	2.1	0.2	95
ii. Groundnut	2.3	2.2	940	2.5	2.0	800	2.4	2.7	1119	3.3	3.6	1091	2.8	2.7	964
iii. Rapeseed & Mustard	19.2	16.7	870	22.2	21.3	960	22.2	17.2	774	23.2	22.3	961	25.0	24.6	984
(E.) Otherss	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
I. Sugercane	0.2	12.0	52650	0.3	13.5	43870	0.2	11.3	46460	0.3	10.8	36000	0.2	7.9	39500
ii. Cotton	4.6	9.2	343	4.7	8.5	303	4.8	10.2	363	6.5	1.5	231	5.8	1.7	293

Sources - (1) Statistical Abstract, Rajasthan (Various Issues) : DES, Rajasthan, Jaipur (2) Eighth Five Year Plan, Rajasthan, 1992 to 97: Planning Deptt., Govt. of Rajasthan. Jaipur (3) Vital Agricultural Statistics 1993-94 : Directorate of Agricultural, Rajasthan. Jaipur.

The main contributory factors to the more stable agriculture of today are:

- a) Increased irrigation potential
- b) Increased use of fertilizers and pesticides
- c) Better crop varieties and quality seeds
- d) Higher level of production technology for cereals, pulses, cotton, sugarcane, etc.

The main strategy for crop production and productivity in Plans in the state has been on the following lines:

- a) Steady growth of food grains production to meet the growing need and a substantial increase in pulse production to improve the nutritional quality of the diet of the people.
- b) To aim at self-sufficiency in production of oilseeds so as to eliminate import of edible oils.
- c) To increase the production of cash crops such as oilseeds, cotton and fruits and vegetables.

Foodgrains

The area under food grains as a whole varied between 80.3 Lakh hectares in 1952-53 and 137.6 Lakh hectares in 1973-74, which was the highest area under food grains in the Plan Period, decreased to 128.4 and to 106.8 Lakh hectares in 1992-93 and 1999-2000 respectively. The production of food grains varied between 33.9 Lakh tonnes in 1952-53 to 114.8 Lakh tones in 1992-93

and decreased to 106.8 lakh tonnes in 1999-2000, due to scanty and irregular rainfall and unfavourable climatic conditions. Productivity in food grains varied between 421 Kg / Ha in 1952-53 to 975 Kg/Ha in 1999-2000.

Cereals

The area under cereals varied between 61.0 Lakh hectares in 1952-53 and 94.0 Lakh hectares in 1992-93 and decreased to 84.8 Lakh tones in 1999-2000. The production of cereals varied between 28.9 Lakh tonnes in 1952 –53 and 100.2 Lakh tonnes in 1992 –93 and decreased to 97.9 Lakh tonnes in 1999-2000 due to scanty rainfall and unfavourable climatic condition.¹ The productivity in cereals varied between 474 kg/ha in 1952-53 and 1187 kg/ha in 1998-99. Thereafter it decreased to 1155 kg/ha in 1999-2000.

The strategy to increase the production and productivity of cereals in plans has been: -

- a) Increase in area under high yielding varieties of seeds
- b) Greater use of chemical fertilizers and plant protection material
- c) Demonstration on large area with large drills by using proper seed rate for better germination
- d) Better transfer of technology with adequate extension services.

Pulses

Table 2.5 reveals that area under pulses varied from 19.4 Lakh hectares in 1952-53 to 36.8 Lakh hectares in 1990-91, which was the highest in the plan

¹ Mruthyunjaya and Praduman Kumar, "Crop Economics and Cropping Pattern Changes", *Economic and Political Weekly*, December 23-30, 1989.

period, and it decreased to 34.4 and 24.8 Lakh hectares in 1992-93 and 1999-2000 respectively. Production of pulses varied from 5.0 Lakh tonnes in 1952-53 to 17.2 Lakh tonnes in 1990-91, which was the highest in the plan period. In 1992-93, the production of pulses was 14.6 Lakh tonnes which decreased to 8.9 Lakh tonnes in 1999-2000. Productivity of pulses fluctuated from 256 kg/ha to 491 kg/ha during 1952-53 to 1990-91. Productivity in pulses was 424 kg / hectares in 1992-93, which decreased to 360 kg / hectares in 1999-2000.

The strategy for achieving higher increase in production of pulses has been as follows: -

- a) Introduction of pulse crops in irrigated farming system
- b) Bringing additional area under short duration varieties of pulses such as moong, urd, soyabean, etc.
- c) Inter-cropping of arhar in bajra, cotton, sugarcane and groundnut both under irrigated and un-irrigated conditions
- d) Multiplication and use of improved pulse seeds
- e) Adoption of plant protection measures
- f) Use of phosphatic fertilizers
- g) Improved post harvest technology
- h) Remunerative prices relative to competing crops and marketing support of pulses
- i) In order to promote an irrigated approach to production, procurement and marketing the pulse crops based on the best available know-how both in irrigated and rainfed areas.

Oilseeds

Oilseeds also deserve special attention for meeting consumer requirements of edible oils and reducing pressure on foreign exchange caused by imports of oils.² Table 2.5 reveals that area covered under oilseeds varied between 5.4 Lakh hectares in 1952-53 and 43.1 Lakh hectares in 1998-1999, which was highest in the plan period. Production of oilseeds varied between 1.3 Lakh tonnes in 1952-53 and 38.2 Lakh tonnes in 1998-99, which was the highest in the plan period. In 1998-99, the production of oilseeds was 38.2 Lakh tonnes which decreased to 34.1 Lakh tonnes in 1999-2000. Productivity of oilseeds varied between 248 kg/hectares in 1952-53 and 937 kg / hectares in 1999-2000, which was the highest in the plan period.

The main constraints in the way of accelerating production of oilseeds are:-

- a) Preponderance of rainfed cultivation
- b) Inability and hesitation on the part of the farmers to use modern inputs due to high risks for yield and prices
- c) High cost and inadequate availability of certified seeds
- d) Susceptibility of oilseed crops to pests and disease which cause substantial losses
- e) Inadequate use of improved agricultural implements for proper placement of seeds and fertilizers, and
- f) Problem of price support, particularly in times of bumper production.

² Ashok Gulati and Tim Kelley, Trade Liberalization and Indian Agriculture, New Delhi, 1999.

Cotton

Area under cotton varied between 1.5 Lakh hectares in 1952-53 and 5.8 Lakh hectares in 1999-2000. Production varied between 1.0 Lakh bales (1 bale = 180 kgs) in 1952-53 and 13.6 Lakh bales in 1996-97 and decreased to 1.7 Lakh bales in 1999-2000. Productivity of cotton varied between 124 kg/hectares in 1952-53 and 386 kg / hectares in 1989-90, which was the highest productivity in the plan period. In 1992-93 productivity of cotton was 363 kg / hectares which decreased to 293 kg / hectares in 1999-2000.

The strategy for raising production and productivity of cotton in the plan period consists of the following components: -

- a) Accelerating the speed of improved technology in both irrigated and rainfed areas, with stress on the use of pure seeds, optimum agronomic practices, integrated pest management and inter cropping in rainfed areas.
- b) Expansion of irrigated area in the commands of medium and minor irrigation projects.
- c) Maximizing the area under high yielding hybrids of cotton.
- d) Timely provision of critical inputs for increasing productivity.

Sugarcane

Area under sugarcane was 0.2 Lakh hectares in 1952-1953. Almost it remained constant in plan period. Production of sugarcane increased gradually during the last four decades though there were fluctuations year to year. The production of sugarcane was 4.1 Lakh tonnes in 1952-53 which increased to 13.5 Lakh tonnes in 1991-92 and decreased to 11.2 Lakh tonnes and 7.9 Lakh

tonnes in 1992-93 and 1999-2000 respectively. The highest production was 22.0 Lakh tonnes in 1978-79. Productivity of sugarcane was 222 quintals/ hectares in 1952-53 which increased to 526 quintals / hectares in 1990-91 and decreased to 395 quintal / hectares in 1999-2000.

The strategy for raising production and productivity of sugarcane during plan period consists of the following components:

- a) The yield of sugarcane is to be stepped-up by providing quality seed, material, adequate supply of fertilizers especially in area with assured irrigation.
- b) Adoption of suitable and timely plant protection measures.
- c) The strategy also covers demonstrations in the farmer's field in respect of management of saloons and improved techniques of cultivation.
- d) Assurance of price support, particularly in times of bumper production.

Table 2.6 reveals the plan-wise trends in area, production and productivity of important crop groups.

Table 2.6: Trends In Area, Production and Productivity : Plan wise [Average of each plan period]

[Area : Lakh Hectares, Production : lakh tonnes/lakh bales, productivity : kg/ha]

Particulars	I Plan (1951-56)			II Plan (1956-61)			III Plan (1961-66)			Annual Plans (1966-69)		
	Area	Prod.	Proivity	Area	Prod.	Proivity	Area	Prod.	Proivity	Area	Prod.	Proivity
A. Cereals	65.6	32.4	493	75.2	33.7	448	81.4	37.1	455	85	38.5	453
B. Pulses	24.6	7.6	309	33	12.7	386	32.3	10.5	325	31.9	9.9	310
C. Total Foodgrains	90.2	40	443	108.2	46.4	429	113.7	47.6	418	116.9	48.4	414
D. Oilseeds	7.2	2.1	289	9.2	2.3	246	11.1	2.6	231	11.4	2.3	198
E. Others	-	-	-	-	-	-	-	-	-	-	-	-
i. Sugarcane	0.2	4.5	21350	0.3	6.9	22290	0.4	7.5	19330	17.7	4.1	13670
ii. Cotton	1.9	1.3	122	2.3	1.6	128	2.4	1.7	129	5.7	1.9	136

Particulars	IV Plan (1969-74)			V Plan (1974-79)			VI Plan (1980-85)			VII Plan (1985-90)		
	Area	Prod.	Proivity	Area	Prod.	Proivity	Area	Prod.	Proivity	Area	Prod.	Proivity
A. Cereals	91.1	50.6	555	81.5	52.4	643	91	65.3	717	87.2	73.8	846
B. Pulses	34.6	12.9	374	39.9	18	450	35.1	14.7	418	29.4	11.6	393
C. Total Foodgrains	125.7	63.5	505	121.4	70.4	580	126.1	79.9	634	116.6	85.3	731
D. Oilseeds	11	3.7	337	10.9	4.4	407	14.9	8	537	25.3	18.5	732
E. Others	-	-	-	-	-	-	-	-	-	-	-	-
i. Sugarcane	0.4	12.8	33740	0.5	21.5	42240	0.3	13.8	40470	0.2	7.2	45820
ii. Cotton	2.9	2.6	164	3.3	4.3	4.3	3.8	4.8	215	4.3	9.9	386

Continued...

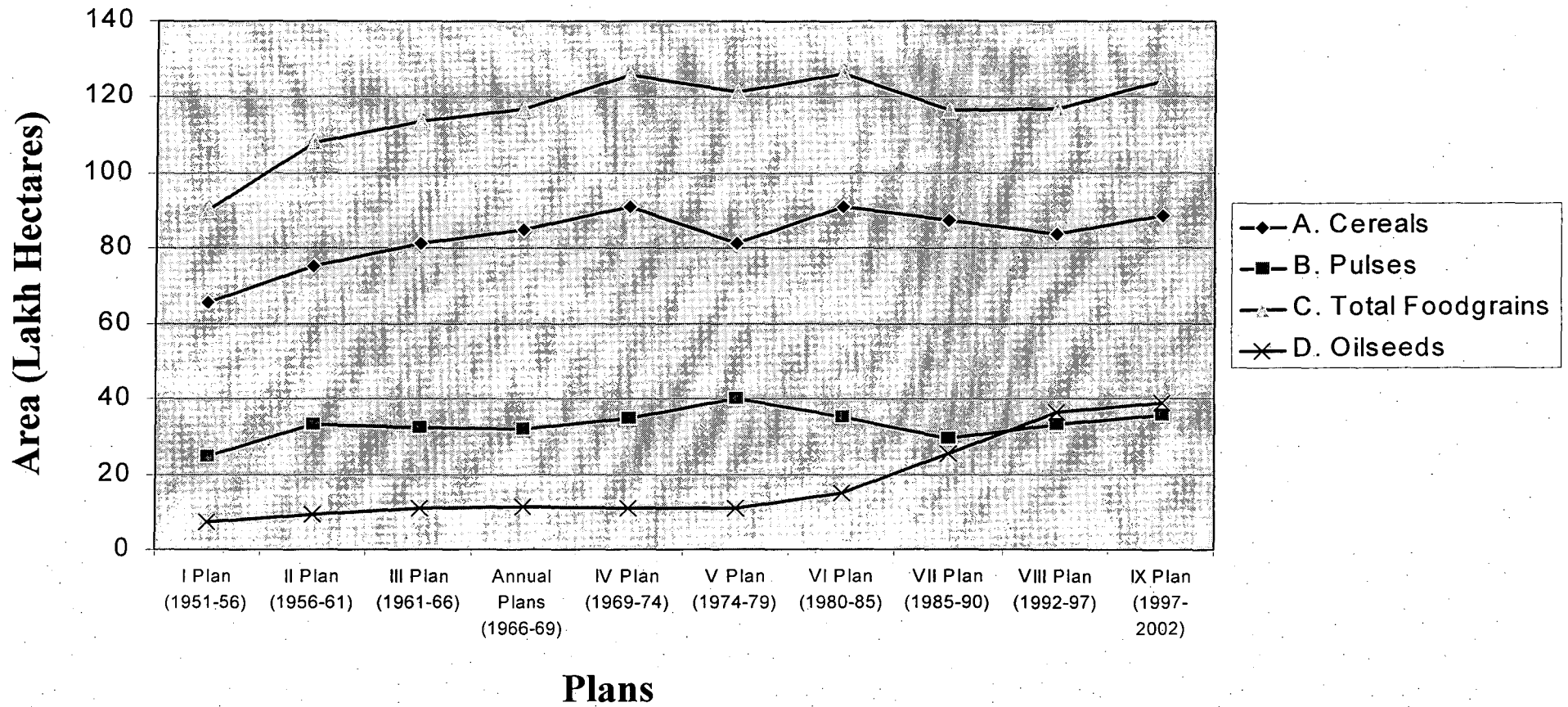
Particulars	(1991-92)			VIII Plan (1992-97)			1992-93			1993-94			IX Plan (1997-2002)		
	Area	Prod.	Provity	Area	Prod.	Provity	Area	Prod.	Provity	Area	Prod.	Provity	Area	Prod.	Provity
A. Cereals	84.4	72.3	833	83.8	97.3	1160	94	100.2	1067	82.8	59.8	721	88.7	115.9	1307
B. Pulses	28.2	9	319	33.3	18.8	570	34.4	14.6	42	33.2	10.7	322	35.6	18.8	528
C. Total Foodgrains	112.6	79.3	704	116.8	116.1	995	128.4	114.8	894	116	70.5	607	124.3	134.3	1084
D. Oilseeds	35.5	27	761	36.5	39.9	1095	33.5	25.4	758	36	24	667	39	39.5	1013
E. Others	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
i. Sugarcane	0.3	13.5	43870	0.3	11.3	50000	0.2	11.3	46460	0.2	10.2	49520	0.2	10	50000
ii. Cotton	4.7	8.5	303	4.5	13	490	4.8	10.2	363	5.2	8.4	275	6	15.3	432

Sources :

- [1.] Agriculture In Rajasthan : A Statistical Hand Book. Dept. Of Agriculture. Rajasthan. Jaipur 1989.
- [2.] Agriculture in Rajasthan. 1991-92 : DES Jaipur [1993]
- [3.] Eight Five Year Plan, Rajasthan 1992-97 : Planning Dept. Of Govt. Of Rajasthan, Jaipur [1993]
- [4.] Vital Agriculture Statistics 1993-94 : Directorate Of Agriculture. Rajasthan. Jaipur [1995]
- [5.] Ninth Five Year Plan [1997-2002] Rajasthan. Jaipur.

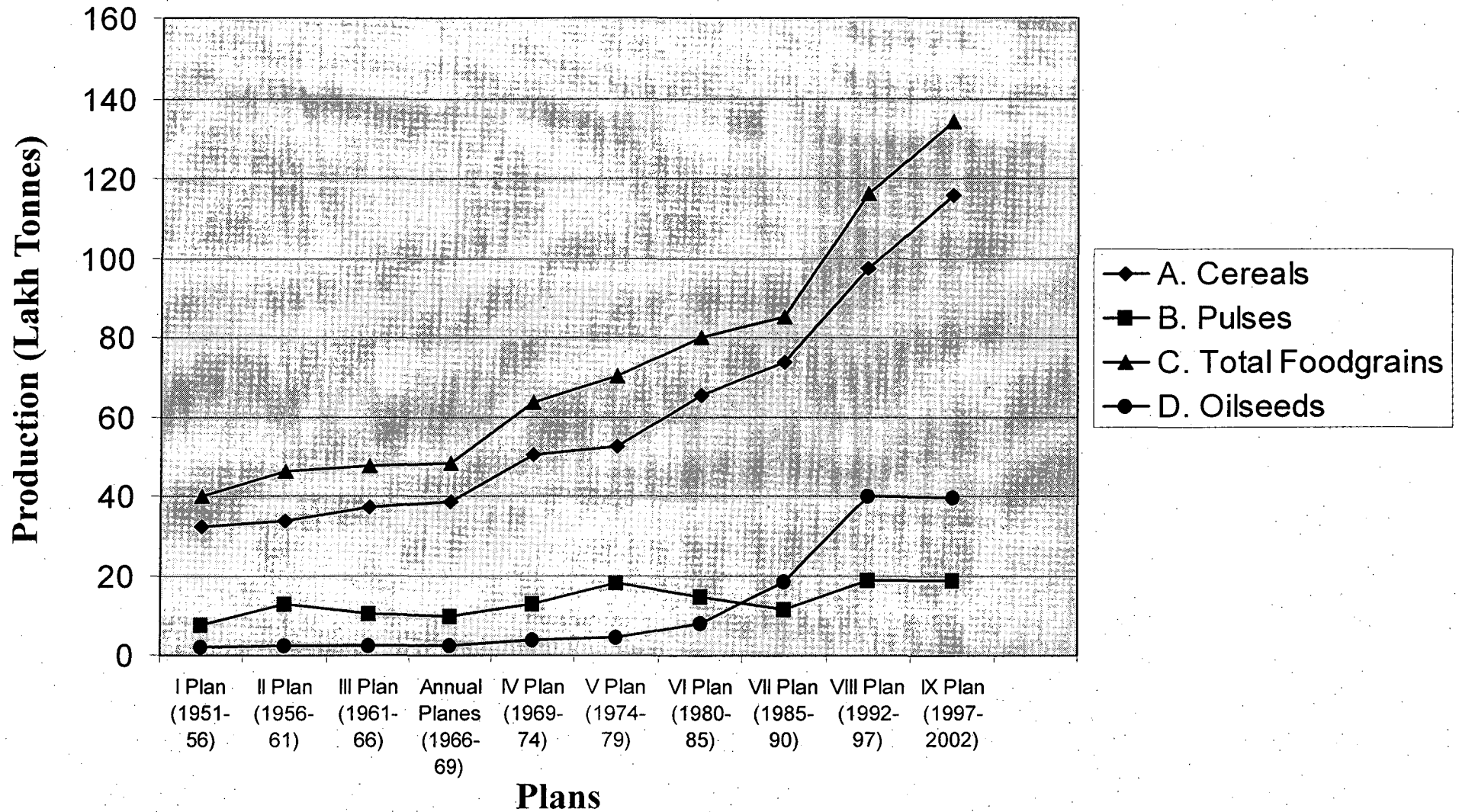
Graph 2.1

Trends in Area of Crop Groups



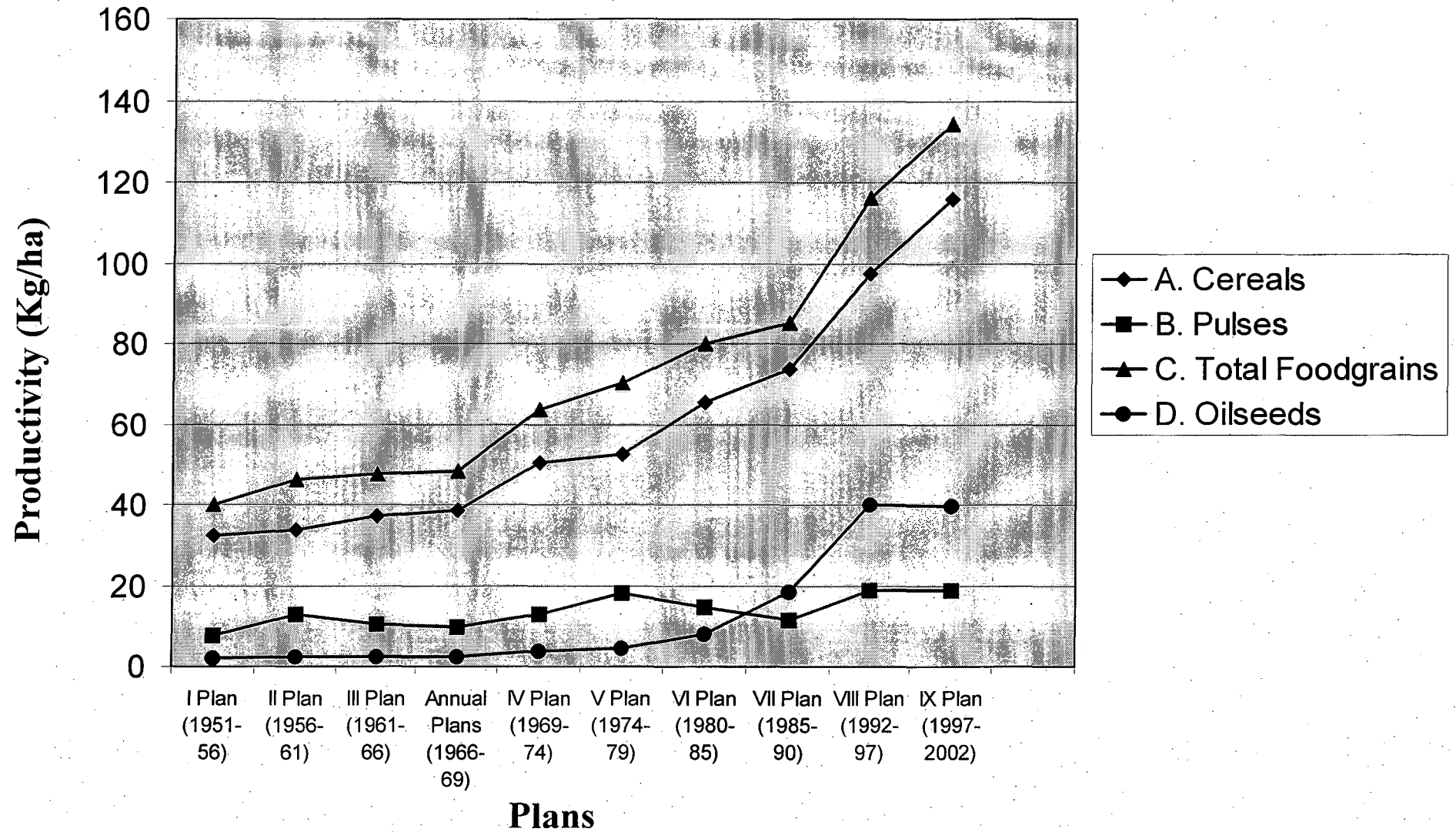
Graph 2.2

Trends in Production of Crop Groups



Graph 2.3

Trends in Productivity of Crop Groups



Compound Growth Rates of Area, Production and Productivity in Rajasthan: Crop Groups

In the face of serious geographical disadvantages and scanty and irregular rainfall in the state, it is not possible to maintain consistency of growth rates of area, production and productivity of individual crops as well as of crop groups.

Table 2.7 depicts the trends in compound growth rates of area, production and productivity of important crop groups.

Foodgrains

Despite the variations in monsoon and weather conditions, growth rate of area under food grains showed a positive trend, except negative trend in fifth plan. Growth rate of food grains production during the pre- green revolution period (1952-53 to 1967-68) was recorded at 1.8 per cent per annum as against 3.8 per cent per annum during the post green revolution period (1967-68 to 1999-2000). During the pre-green revolution period area under food grains showed an increase of 2.6 per cent per annum, but the growth rate of production showed positive trend and productivity showed a negative - 0.7 per cent per annum) trend. During the post green revolution period (1967-68 to 1999-2000) area under food grains showed a heavy declination. Growth rate of area under foodgrains was only of 0.4 per cent per annum during the post green revolution period (1967-68 to 1999-2000). Growth rate of productivity of foodgrains was negative during pre-green revolution period but it showed an increase of 3.4 per cent per annum during the post green revolution period.

Table 2.7: Compound Growth Rate Of Area, Production And Productivity In Rajasthan : Crop Groups

(Growth Rates :
Percent)

Crop Groups	I Plan	II Plan	III Plan	Annual	IV Plan	V Plan	VI Plan	VII Plan	Between 1990-91 and 1993-94	Plan VIII [1992-97]	1952-53 TO 1967-68	1967-68 TO 1999-00	1952-63 TO 1999-2000
	1951-56	1956-61	1961-66	1966-68	1969-74	1974-79	1980-85	1985-90					
1 Cereals	-	-	-	-	-	-	-	-	-	-	-	-	-
Area	1.9	2.8	1.6	1.5	1.4	(-) 2.2	2.2	(-) 0.5	(-) 0.6	(-) 0.1	2.3	0.4	1.1
Production	2.9	0.8	2.0	1.2	5.6	0.7	4.5	0.2	5.2	6.7	1.5	4.0	3.2
Productivity	1.0	(-) 0.2	0.3	(-) 0.1	4.1	3.0	2.2	0.7	5.3	6.8	(-) 0.8	3.6	2.0
2 Pulses	-	-	-	-	-	-	-	-	-	-	-	-	-
Area	6.2	6.1	(-) 0.4	(-) 0.4	1.6	2.9	(-) 2.5	(-) 3.4	2.9	3.2	3.4	0.4	1.4
Production	11.2	10.8	(-) 3.8	(-) 1.9	5.5	6.8	(-) 3.9	(-) 4.1	2.0	15.9	3.3	2.4	2.7
Productivity	4.7	4.6	(-) 3.4	(-) 1.6	3.8	3.8	(-) 1.5	(-) 0.7	4.7	12.3	0.0	2.0	1.3
3 Foodgrains	-	-	-	-	-	-	-	-	-	-	-	-	-
Area	3.8	3.7	1.0	0.9	1.5	(-) 0.7	0.8	(-) 1.3	0.6	0.7	2.6	0.4	1.2
Production	4.3	3.0	0.5	0.6	5.6	2.1	2.6	(-) 0.5	4.7	7.9	1.8	3.8	3.1
Productivity	1.5	(-) 0.6	(-) 0.5	(-) 0.3	4.1	2.8	1.8	0.7	3.9	7.2	(-) 0.7	3.4	1.9
4 Oil Seeds	-	-	-	-	-	-	-	-	-	-	-	-	-
Area	7.5	5	3.8	1	(-) 0.7	(-) 0.3	6.4	6.5	10.8	0.6	6	3.9	4.7
Production	11.8	2.1	2.4	(-) 3.9	10.4	3.6	12.5	11.3	12.9	8.1	2.9	10.2	7.6
Productivity	3.9	(-) 3.2	(-) 1.3	(-) 5	11.2	3.8	5.7	4.6	2.4	7.5	(-) 3	6.1	2.8

Sources :

- 1 Agriculture in Rajasthan : A Statistical Hand Book, Deptt. Of Agriculture, Rajasthan. Jaipur. (1989)
- 2 Eighth Five Year Plan, Rajasthan, 1992 - 97 : Planning Deptt. Govt. of Rajasthan.
- 3 Vital Agrcultural Statistics, 1993 - 94, Directorate of Agriculture Rajasthan. Jaipur (1995)

During the post-green revolution period the increase in the growth rate of foodgrains production and productivity was brought about by use of HYV seeds, fertilizers, plant protection materials and by increasing irrigation facilities. For the whole period (1952-1953 to 1999-2000), the growth rates of area, production and productivity of foodgrains showed an increasing trend. These were recorded 1.2, 3.1 and 1.9 per cent per annum respectively in this period.

Cereals

In case of cereals, growth rate of area under this crop group fluctuated from plan to plan. It was recorded positive during first, second, third, fourth and sixth plans but recorded negative during fifth and seventh plans growth rate of area under cereals during pre-green revolution period (1952-53 to 1967-68) was recorded at 2.3 per cent per annum's as against only 0.4 per cent per annum during the post green revolution period (1967- 68 to 1999-2000). During the whole period (1952-53 to 1999-2000) the growth rate of area under cereals was recorded 1.1 per cent per annum. This decline caused due to unfavourable weather conditions.

Growth rate of production of cereals during the pre-green revolution period (1952-53 to 1999-2000) was recorded 1.5 per cent per annum as against 4.0 per cent per annum during the post queen revolution period (1967-68 to 1999-2000). For the whole period (1952-53 to 1999-2000), the growth rates of area, production and productivity were registered positive. These were recorded 1.1, 3.2 and 2.0 per cent per annum respectively.

Growth rate of productivity of cereals was registered negative [(-) 0.8 per cent per annum] during the pre-green revolution period but it was registered

positive during the post green revolution period and for the whole. The increase in the production of cereals was recorded due to increase in the productivity of cereals. It can also be observed that acceleration in growth rate of cereals production also came due to use of modern technology of HYV seeds and increase in productivity.

Pulses

Growth rates of area, production and productivity of pulses were discouraging during plan period. Growth rate of area under pulses fluctuated very much from plan to plan. Growth rates of area, production and productivity were registered negative during the third plan, three annual plans, sixth plan and seventh plan and was registered positive during first, second, fourth and fifth plan.

During the pre-green revolution period (1952-53 to 1967-68) the growth rate of production of pulses was recorded 3.3 per cent per annum. This increase in the growth rate of production of pulses was mainly due to 3.4 per cent increase in area sown under pulses. The growth rate of productivity at pulses was registered at zero per cent per annum.

During the post green revolution period (1967-68 to 1999-2000), growth rates of area, production and productivity of pulses were registered positive. The growth rate of area under pulses was non significant i.e. 0.4 per cent per annum. The growth rates of production and productivity of pulses were 2.4 and 2.0 per cent per annum respectively during the post green revolution period. The production of pulses increased only due to increase in area under pulses because growth rate of productivity was registered zero. For the whole period (1952-53 to 1999-2000) area under pulses increased 1.4 percent, production 2.7

per cent and productivity 1.3 per cent per annum. This increase was partly due to increase in area under pulses and partly due to increase in productivity.

Oilseeds

The growth rates of area production and productivity of oilseeds were encouraging during plan period, except three annual plans. The production of oilseeds in the state during the pre-green revolution period (1952-57 to 1967-1968) increased 2.9 per cent per annum but productivity decreased 3.0 per cent per annum during the same period. This increase in the production of oilseeds was registered due to increase in area under oilseeds at 6.0 per cent per annum. Growth rates of area, production and productivity of oilseeds showed a significant increase during the post green revolution period (1967-68 to 1999-2000) and for the whole period (1952-53 to 1999-2000). During the Post-Green Revolution period, area under oilseed at the rate of 10.2 per cent and productivity at the rate of 6.1 per cent per annum. For the whole period (1952-53 to 1999-2000), the growth rate of area under oilseeds was recorded 4.7 percent, of production 7.6 per cent and of productivity 2.8 per cent per annum. The increase in the growth rate of production of oilseeds was partly due to increase in area under oilseeds and partly due to increase in productivity of oilseeds.

Various Programmes for Boosting up Agricultural Production and Productivity

National Pulses Development Project (NPDP)

For increasing the pulses production, in 1986-87 the previous Pulses Development Project prevalent in 1974-75 was included in the National Pulses Development Project. Under this project, farmers were given subsidy and

various steps were taken to boost up the production of pulses. Many incentives were given like distribution of mini-kits, training programmes, plant protection measures. Subsidies were shared by the centre and the state on 75:25 basis.

National Oilseeds Development Project (NODP)

The government introduced a number of development programmes for accelerating the production of oilseeds. Centre's share during 1984-85 in the schemes was 100 per cent, for increasing the production of oilseeds. While during 1986-87, the centre and state shared on 50:50 basis.

During 1987-88, a new programme, Oilseeds Production Thrust Programme (OPTP) was implemented in which centre had cent per cent share. Both programmes were carried out till 1989-90. By merging both the programmes, Oilseeds Production Programme (OPP) was started during 1990-91. Now onwards the centre and the state shared all expenditure on 75:25 basis. The basic strategy of edible oils development was:

- Improvement of oilseed technology for stepping up yields;
- Strengthening services to the farmers i.e. providing seeds, fertilizers, pesticides, irrigation and credit etc.;
- Price support to farmers;
- Improved processing which could increase the oil yield.

Special Food Production Programme (SFPP)

In the middle of the seventh plan, the Planning Commission introduced the SFPP for the increase in production of foodgrains, in the country. In 1990-

91, Rajasthan brought 14 districts for wheat, 8 for grams, 7 for maize and 8 for Bajra under this programme.

Under this programme grants are given for pesticides agricultural tools and also for organizing exhibitions. As a result of these programmes the production of crops like wheat, grams, maize and bajra has gone up in selected districts.

Arid-Area Planning: Dry Land Farming

Dry land farming is done in those areas where rainfall is low, erratic and irregular. These areas have limited surface irrigation and ground water potential, high evaporation. In Rajasthan nearly 30 per cent of total cropped area is irrigated and the balanced continues to depend on rains. Even though the rainfed areas account for 70 per cent of the cropped area, their contribution amounts to only 40 to 45 per cent of total foodgrains production. Most of the quality of cereals, Pulses, oilseeds and cotton is produced in the rainfed areas. Wide fluctuations in production occur in these areas year after year and these fluctuations adversely affect the agricultural production and agricultural economy of the state.

The main constituents of the dry land farming technology are:

- Soil Management
- Harvesting of water
- New crop varieties
- New agronomic practices.

Soil management includes the measures relating to soil structure, soil fertility and correction of alkalinity of soil. The introduction of new crop varieties is equally important. The new agronomic practices include the application of nutrient through foliar feeding.

During the Second Plan (1956-61), Dry Farming Projects were taken up and were extended in subsequent plans. The Sixth Plan (1980-85) laid greater emphasis on increasing agricultural production on dryland/rainfed lands. 19.9 lakh hectares of area was brought under dryland farming. During Seventh Five Year Plan (1985-90) 42.6 thousand hectares of area was covered under soil and moisture conservation. An integrated watershed Development Project was also undertaken in four districts. During Ninth Five Year Plan (1997-2002) 8.5 lakh hectares of area was covered under soil and moisture conservation.

Thus we can say that by the use of dryland farming state can increase production and productivity of different crops

Factors Affecting Cropping Pattern, Production and Productivity in Rajasthan

The cropping pattern and productivity of a state depends upon fertility status of soil, irrigation, climatic conditions, rainfall and attitude of the cultivators etc. In the arid area of Rajasthan rainfall is scanty and erratic. Monsoons are uncertain. Crops depend entirely on rains. In rainfed areas only those crops are grown which require less water, such as bajra, jowar and small millets.

The cropping pattern and productivity depends upon availability of irrigation facilities. With assured irrigation facilities, not only different crops

can be grown, but even double and triple cropping can be possible.³ With better irrigation, the entire techniques of cultivation change. Superior crops can be grown and better rotation of crops may be possible. The cropping pattern changes because of availability of better implements, better irrigation, improved seeds, fertilizers and agricultural credit.

Economic motivations also determines the cropping pattern in a state such as harvest price and income maximization, farm size, insurance against risk etc. Income maximization has greater influence in changing the crop pattern. The farmer chooses that combination of crop which yields him maximum income. Dr. Raj Krishna argued that relative profitability (per hectare) was the main consideration which influenced the cropping pattern.

Cropping pattern and productivity depends on the farm size. Small farmers produce foodgrains first, for their requirement. They go for cash crop only after they have met their requirements of foodgrains. The need for subsistence has been dominating the cropping pattern of small and marginal farmers in the state. Small farmer makes significant adjustments in this crop-pattern in order to maximize his income. The cropping pattern also depends on the choice of the owner of land, under crop sharing system. The tiller of the land cannot grow the crops of his choice. He has to chime in with the choice of the land owner.

Cropping pattern and productivity can be diverted through appropriate change in economic motive, because economic consideration is an important factor among factors affecting cropping pattern. The real difficulty in adopting a better cropping pattern is lack of capital and technical know-how.

³ Mruthyunjaya and Praduman Kumar, "Crop Economics and Cropping Pattern Changes", *Economic and Political Weekly*, December 23-30, 1989.

In the country like India, small farmers face deficiency of finances due to which it is not possible for them to use good quality seeds, fertilizers and tubewells for irrigation. To improve agricultural practices it is necessary that tillers enjoy financial availability. Many of the marginal and large farmers have now shifted to commercial farming; but small farmers could not do so due to lack of material required. But he is willing to shift to improved agricultural practices as said by Lezinsky.

“To have better standard of living farmers want to adopt better agricultural practices.”

For this they need finance and at present this need is being fulfilled by various institutions as explained below.

Institutional Credit Flow to Agriculture in Rajasthan

Agriculture credit is one of the most important input in agricultural development programmes. For a long time, the major sources of agriculture credit had been the private moneylenders.⁴ This source of credit was inadequate, highly expensive and exploitative. Since independence, a multi-agency approach consisting of co-operatives, commercial banks and regional rural banks – known as institutional credit – has been adopted to provide cheaper and adequate credit to farmers. The credit support given by those institutions to farmers is known as institutional support.

The expansion of the rural credit delivery system in India in terms of both number of branches and quantum of credit has been impressive, especially

⁴ Gadgil, M. V., “Agriculture Credit in India: A Review of Performance and Policies”, Indian Journal of Agriculture Economics, 41(3), 1986, in which Gadgil argues that non-institutional agencies are still an important source in meeting the credit requirements of the rural households in general and farmers are particular.

in the post-nationalisation period. Innovations, such as the creation of RRBs and NABARD also contributed to expansion. The expanded rural credit delivery system has been instrumental in nurturing rural savings and also in catering to the credit needs of the identified priority groups.

The basic objectives of this institutional credit support to farmers in Rajasthan was:

- To ensure timely and increased flow of credit to farmers;
- To reduce and gradually eliminate the money lender from farming sector;
- To make available credit facilities to all farmers particularly small and marginal farmers for reducing inequality of income;
- To provide larger credit support for Pulses Development Programme and National Oilseeds Development.

Cooperatives

The cooperative movement in Rajasthan can be traced from as early as 1904 when the first cooperative was organized in Ajmer. In the beginning, the cooperatives primarily performed the functions of providing rural credit specially to the agriculturists and encouraging thrift – self-help and cooperation amongst agriculturist, artisans and persons of limited means. The priority areas were credit, marketing, consumer services, agro-processing and daily cooperatives. But over a period of time, it has spread its wings into many other sectors of the economy. Presently, the activities of cooperatives include providing short term credit for raising crops, investment loans for increasing productivity of land, supply of agricultural inputs like fertilizers, seeds, insecticides/pesticides, marketing of agricultural produce, setting up of agro-processing units, and providing housing infrastructure and urban consumer

credit. In fact, cooperatives have been the flagship of both the 'Green Revolution' and 'White Revolution' in the country and the state.

The contribution of the cooperative sector in the economy of Rajasthan is immense. About 90 per cent of the institutional credit to the farmers is being provided by cooperatives. About 70 per cent of the district credit plan is fulfilled by Cooperative Banks. 30 per cent of the total agricultural inputs is being supplied by the cooperative marketing organizations. India leads the world in milk production – the contribution of the cooperative sector in milk production and distribution is about 95 per cent. Looking to these significant contributions, if we take the agriculture and allied sector as a whole, then even at a conservative estimate, the contribution of cooperatives is about 50 per cent to this sector.

Table 2.8: Plan Outlay of the Cooperative Sector

S.No.	Plan	Outlay of the Co-operative Sector (Rs in crores)	% Share of Total State Plan Allocation
1.	First Plan (1952-56)	3.30	5.27
2.	Second Plan (1954-61)	14.26	7.84
3.	Third Plan (1962-66)	16.91	7.23
4.	Fourth Plan (1970-74)	8.12	2.67
5.	Fifth Plan (1995-80)	15.41	1.67
6.	Sixth Plan (1980-84)	25.50	1.20
7.	Seventh Plan (1985-90)	46.20	1.50
8.	Eighth Plan (1992-97)	120.00	1.30
9.	Ninth Plan (1997-2002)	150.00	0.54
10.	Tenth Plan (2002-07)	208.55	0.65

Source: Tenth Five Year Plan, 2002-2004, Vol. I.

From the table it is clear that except during the first three plans, the percentage share of the cooperative outlay in the total State Plan Allocation has

been on a decrease with a minor increase in the Seventh Plan. The cooperatives, on the other hand, have recorded multiple increases in their coverage of services, especially, rural credit, supply of farm inputs and essential commodities and many other aspects of economic development.

The rural cooperative credit institutions have been organized into short-term and long-term structures. The short-term and medium term cooperative credit structure is based on the three-tier structure. At the lowest tier are the Primary Agricultural Credit Societies (PACS). These are organized at the village level. At the second tier are the District Central Co-operative Banks (CCBs) organized at the district level. At the third and uppermost tier are the State Co-operative Banks organized at the state level. As far as the village level PACS are concerned, they can be formed by any ten or more than ten persons. These societies generally advance loans only for productive purposes. The chief task of the central cooperative banks is to advance loans to the PACS in times of need so that they can fulfill the requirements of farmers. The state cooperative bank in turn, advances loans to the CCBs in order to augment their capacity to provide loans to the village level PACS. It also coordinates and regulates the working of CCBs.

Table 2.9 reveals that in 1990-91 there were 5261 Primary Agricultural Credit Societies (PACS) with 44.17 lakh members. This number rose to 5308 in 1994-95 but with reforms in cooperatives the number suffered a reduction and in 2001-2002 stood at 5252 with 45.87 lakh members. Members who availed loans from PACS varied between 13 lakh to 15 lakh from 1992. Analysis shows that the number of defaulting members (who did not pay their loan during the year) was maximum in 1991-92, while it was minimum in

1997-98. The finding shows that it was during the drought years that the number of defaulting members had increased.

Table 2.9: Statement Showing the Position of Borrowing and Non-Borrowing Members

	Years	Total Number of PACS	Total Membership	Members Aailed Loan during the year	Members Did Not Aailed Loan	Defaulting Members	Total Members Aailed Loan
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(5+7)
1.	1990-91	5261	4417610	684361	3783249	617441	1301802
2.	1991-92	5267	4537348	744826	3792522	729740	1474566
3.	1992-93	5277	4614351	1338986	3275365	581980	1920966
4.	1993-94	5298	4694184	1268816	3425268	628281	1897097
5.	1994-95	5308	4876066	1339537	3536529	516498	1856035
6.	1995-96	5307	4949872	1462928	3486944	490778	1953706
7.	1996-97	5301	4910771	1455907	3454864	415810	1871717
8.	1997-98	5272	4899549	1499034	3400515	358430	1857764
9.	1998-99	5255	4909745	1396255	3513490	446048	1842303
10.	1999-2000	5248	4743962	1337798	3406164	505066	1842864
11.	2000-01	5252	4614929	1369923	3245006	380056	1749979
12.	2001-02	5252	4743962	1334447	3252908	448213	1782660

Source: The Rajasthan Co-operative Bank Ltd., Jaipur.

Table 2.10: The Position of Various heads of CCBs in Rajasthan (Rs. in lakhs)

Particulars	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-2000	2000-01	2001-02	2002-03
Working Capital	81512.67	94412.16	119204.97	140283.84	164983.55	194692.33	217393.59	247109.36	286913.58	393079.31
Agriculture Advances	28971.01	34285.56	42661.1	55133.39	68377.8	87724.94	94323.5	90171.8	116873.8	119026.82
Total Agriculture Demand (June)	40329.21	46260.00	53007.22	63540.84	75305.43	93982.97	107415.13	115963.36	147069.07	158141.18
Collection Agricultural Demand (June)	27310.77	34696.87	42732.04	53530.22	65341.03	78922.45	83121.93	91542.57	115790.49	122144.69
% of Recovery against total demand (June)	67.72	75.00	80.62	84.25	86.77	83.98	77.38	78.94	78.73	77.24

Source: The Rajasthan Co-operative Bank Ltd., Jaipur.

Table 2.10 reveals the positions of various Heads of CCBs. CCBs are working in 26 districts out of 32 districts in Rajasthan. The working capital of CCB, has increased continuously since 1993-94 (from 81512.67 lakh during 1993-94 to 333079.31 lakh during 2002-2003). The agriculture advances increased during the period (1993-94 to 2002-2003).

The percentage of recovery against total agriculture demand has been reasonably good till 1998-99. It deteriorated from 1999-2000 and became static at around 78 per cent.

**Table 2.11: Agricultural Programme of CCBs
(Central Co-operative Banks)**

(In lakhs)

Year	Short Term		Medium Term (Farm Sector)
	Target	Achievement	Advances
1993-94	25000	28479	491.99
1994-95	27500	33027	1258.13
1995-96	40000	39624	3036.68
1996-97	49540	51142	3991.37
1997-98	60000	64210	4167.93
1998-99	80000	82095	5629.91
1999-2000	95440	88727	5596.07
2000-2001	106500	84780	5391.33
2001-2002	115000	110380	6483.89
2002-2003	127500	113168	5859.14

Source: The Rajasthan Co-operative Bank Ltd., Jaipur.

Commercial Bank and Regional Rural Bank

Increasing requirement of rural credit among farmers and upcoming role of commercial banks called for policy of nationalisation of banks so as to institutionalize rural credit system was introduced in 1969. This was followed by the nationalization of 6 more banks in 1980. After nationalization the banks opened a large number of branches in rural areas and have increased their advances to these areas considerably. Thus commercial banks have played an important role in providing rural credit. This has enabled farmers to purchase agricultural inputs and adopt new technology on an increasing scale.

Despite the many strenuous efforts⁵ of the GOI and the Reserve Bank after social control over banks and nationalization of 14 major commercial banks, a large proportion of the rural poor remained outside the banking fold. A working group was appointed in 1975 under the chairmanship of Mr. M. Narasimham to explore the possibilities of evolving an alternative rural credit agency to benefit the elements excluded.

It recommends formation of a new set of regionally oriented rural banks which would combine the co-operatives local feel and familiarity with problems and the commercial banks business acumen, ability to mobilize deposits, access to central money markets and modern outlook. The authorized capital of these small institutions was to be Rs. 1 crore each, to be shared in the ratio of 50:35:15 among the central government, a sponsor bank and the concerned state government. The working group recommended setting up only five RRBs initially, which would serve as pilot institutions. Six RRBs were

⁵ These includes schemes, programmes and new bodies, such as lead bank scheme, drought prone area programme, large-size adivasi multipurpose cooperative societies, farmers service societies, small farmers development agency, and marginal farmers and agricultural labourers development agency, among others.

established in the very first year itself, which number had risen to 196 by 1987.

No new RRBs have been formed since then.

The mandate of the new institutions was⁶: -

- To take banking to the doorsteps of rural masses, particularly in areas without banking facilities until then;
- To make available cheaper institutional credit to the weaker section of the society, who were to be the only client of these banks;
- To mobilize rural savings and channelize them for supporting productive activities in rural areas;
- To generate employment opportunities in rural areas; and
- To bring down the cost of providing credit in rural areas.

⁶ K. P. Agarwal, V. Puhazhendhi and R. S. S. Satyasui, "Gearing Rural Credit for the Twenty-First Century", *Economic and Political Weekly*, October 18-24, 1997.

Table 2.12: Deposits and Advances to Agriculture of Commercial Banks and RRBs

	March 1991			March 1992			March 1993			March 1994		
	Comm. Banks	RRBs	Total	Comm. Banks	RRBs	Total	Comm. Banks	RRBs	Total	Comm. Banks	RRBs	Total
No. of Branches	1978	1070	3048	1988	1068	3066	2031	1070	3101	2071	1070	3141
Total Deposits	5701	282	5983	6399	310	6709	7464	424	7888	8723	508	9231
Core Deposits (Total Deposits Excl. Inter Bank Deposits)	-	-	-	5891	310	6201	7129	424	7553	8071	502	8573
Total Advances	3003	151	3154	3280	159	3439	3102	200	4102	4150	217	4367
Total Agriculture Advances	770	75	845	846	78	924	992	89	1081	1037	113	1150
Total Agriculture Advances to Total Advances	25.6	49.8	26.8	25.8	49.0	26.9	25.4	44.5	26.4	25.0	52.0	26.3

Continued...

	March 1996			March 1997			March 1998			March 2000		
	Comm. Banks	RRBs	Total	Comm. Banks	RRBs	Total	Comm. Banks	RRBs	Total	Comm. Banks	RRBs	Total
No. of Branches	2144	1065	3209	2178	1061	3239	2202	1062	3264	2251	1036	3287
Total Deposits	12045	892	12937	14186	1120	15306	16961	1202	18163	23373	1989	25362
Core Deposits (Total Deposits Excl. Inter Bank Deposits)	11311	891	12202	13359	1119	14478	15852	1202	17055	21906	1987	23893
Total Advances	5443	367	5810	6522	457	6979	7891	499	8390	10513	815	11328
Total Agriculture Advances	1189	198	1387	1380	235	1615	1630	271	1901	2175	495	2670
Total Agriculture Advances to Total Advances	21.8	54.0	23.9	21.4	51.3	23.3	20.7	54.3	22.7	20.7	60.7	23.6

continued...

	March 2001			March 2002			March 2003		
	Comm. Banks	RRBs	Total	Comm. Banks	RRBs	Total	Comm. Banks	RRBs	Total
No. of Branches	2268	1028	3296	2278	1020	3298	2319	1014	3333
Total Deposits	25257	2342	27599	30482	2735	33217	33450	3053	36503
Core Deposits (Total Deposits Excl. Inter Bank Deposits)	24164	2318	26482	29106	2721	31807	31866	3052	34938
Total Advances	12876	960	13836	15636	1133	16769	17451	1376	18827
Total Agriculture Advances	2667	536	3203	3390	602	3992	4091	764	4855
Total Agriculture Advances to Total Advances	20.7	55.8	23.1	21.7	53.1	23.8	23.4	55.5	25.8

Source: State Level Bankers Committee, Various Issues, Rajasthan.

Table 2.12 reveals the position of commercial banks and regional rural banks. Following are the main findings of the observations: -

No. of Branches: During the year ended March 1991, Commercial Banks and RRB were having 1978 and 1070 branches respectively. During the decade of 1990s the total network of Commercial Banks' branches has gone up from 1978 as on March 1991 to 2251 as on March 2000. And it increased to 2319 in the ending of the banking year 2003. While the data show that the branches of RRBs has declined continuously since 1991 (from 1070 as on March 1991 to 1014 as on March 2003).

Deposits: The total deposits of all banks registered growth during 1991 to 2003. Total deposits grew from 5983 crore as on March 1991 to the level of Rs. 36508 crores on the last Friday of March 2003. Similarly the core deposits of the banks increased from 8201 crores as on March 1992 to Rs. 34938 crores as on March 2003.

Advances: The advance portfolio showed an increase from Rs. 3154 crores as on March 1991 to Rs. 18827 crores as on March 2003. Total advances of RRB have shown increment during the period. As compared to the level of Rs. 151 crores as on March 1991 this level has gone up to Rs. 1376 crores as on March 2003. Total advances of commercial banks also increased from Rs. 3003 crores as on March 1991 to Rs. 17451 crores on March 2003.

Total Agriculture Advances: The total advances of all banks registered growth during 1991 to 2003. Total agriculture advances portfolio showed an increase from Rs. 845 crores as on March 1991 to Rs. 4855 crores as on March 2003.

It is observed that total agriculture advances to total advances remained stagnated at around 26 per cent till March 1994 for all banks. Thereafter it declined from 23.9 per cent in 1996 to 23 per cent in 2001. During last two years (2002 and 2003) we find increasing volume of total agriculture advances to total advances. Data show that there is a continued slackness in the flow of mentioned advances of commercial banks from 1991-2001. From 2002 it started to increase because banks have successfully worked out their own action plan for improving this. For RRB, it fluctuated between 44.5 per cent to 60.7 per cent. It was lowest during 1993 and highest during 2000.

Conclusion

In conclusion, it can be said that the government committees have not been successful in the recovery of delivered loans. On an average 30-35 per cent of loans are not paid even after the due date is over. Due to this reason, these institutions face difficulty in getting refinance from apex institutions. This has an adverse effect, particularly on those farmers who need institutional lending desperately. Even the basis of fixing interest rates of these institutional loans is political rather than economic. Various political parties promise loans and other concessions during election period and in a way strengthen the mentality of farmers not to repay the loans. This is a serious weakening of the cooperative tradition.

The objective of nationalization of major commercial banks was to make credit easily accessible to the regions and classes of farmers, who had been inadequately served earlier. In reality, bank branches opened in areas with already well-developed existing banking infrastructure. This led to slow distribution of bank credit between districts. Over and above this, the coverage

of the population by banks has deteriorated in Rajasthan and more so in rural areas.

Deposit mobilization has however improved, especially since the reforms were initiated. Rural deposits with banks have gone up too. The credit deployed has also gone up but total agriculture advances to total advances have shown a downward trend. This is not good for Rajasthan's economy. It could also mean that there is enhanced dependence on the informal sector for funds in the state, which would entail a higher cost of investment. Thus, agricultural credit requires both quantitative and qualitative improvement.

CHAPTER 3

TERMS OF TRADE FOR AGRICULTURE SECTOR IN RAJASTHAN

Studying the Terms of Trade (TOT) in the agriculture sector in Rajasthan forms an important aspect of understanding the changes in Rajasthan's agrarian economy. After independence, many economists like R. Thamarajakshi, D. S. Tyagi, Nalini Vittal, M. L. Dantawala, Ashok Mitra, A. S. Kahlon, C. H. Shah have studied inter-sectoral TOT. Their studies included TOT between agriculture and the industrial sector and dealt mainly with two aspects – the net barter terms of trade and the income terms of trade.

R. Thamarajakshi's article published in 1969 (covering the period 1951-52 to 1965-66) was the first-ever systematic attempt to apply the concept of TOT to inter-sectoral transactions. She covered the period up to 1987-88 by updating the series of net barter TOT in 1990.¹

The importance of monitoring the TOT for the agricultural sector was recognized by the Government of India in 1980. Consequently, the terms of reference of the Commission for Agricultural Costs and Prices (CACP) were modified to include this aspect. Since then the CACP has been constructing the

¹ Thamarajakshi, R. (1990), Inter-Sectoral Terms of Trade Revisited, *Economic and Political Weekly*, Vol. 25, No. 13 (March). She estimated the barter terms of trade used wholesale price index numbers to represent prices paid by the agricultural sector and for representing the prices received by the agricultural sector, wholesale price prevailing in primary markets during the peak marketing period were used. No secular trend is observed in the net barter terms of trade for the agricultural sector. She also estimated the income terms of trade for agriculture for the period 1971-72 to 1989-90 which show an increasing trend since the middle of the seventies.

Mishra and Hazel (1996) have estimated gross terms of trade as well as index of income change for the agriculture sector. The gross terms of trade series was constructed as the ratio of index of implicit prices for the agricultural and non-agricultural sectors. The index of income change was constructed by multiplying the barter terms of trade with the all-crop productivity index.

series and monitoring the terms of trade at the all-India level. The base period being used by the CACP for constructing the series of index of TOT is the triennium ending (TE) 1971-72. In March 1993, the central government appointed a Task Force to examine the terms of trade and suggest changes in the methodology for the construction of indices of TOT. In 1995, the Task Force in its report submitted to the government recognized importance of monitoring the terms of trade at the state level.

With the help of TOT in agriculture, the actual positions of farmers can be evaluated. One can easily find out whether economic gains can really help in the upliftment of the status of the farmers or not.

Approach and Methodology

Several alternative approaches have been used by scholars and organizations/governments to estimate the terms of trade for the agricultural sector.

There are at least two common features of these approaches. These are:

- (i) All of them use ratios of two sets of prices to estimate the terms of trade.
- (ii) All approaches involve a large number of commodities in the numerator as well as in the denominator. Therefore, some sort of weighted composite index numbers are constructed for use as numerator and the denominator.

Commonly used concepts of TOT in Indian literature (Thamarajakshi, 1994; Kahlon and Tyagi, 1983; Rath, 1985; Mungekar, 1992; and Government of India, 1995) are of the following types): -

$$(a) \quad \text{INBTOTA} = \frac{\text{IWPA}}{\text{IWPM}} \times 100$$

$$(b) \quad \text{INBTOTA} = \frac{\text{IPRA}}{\text{IPFI}} \times 100$$

$$(c) \quad \text{INBTOTA} = \frac{\text{IPRA}}{\text{IPFICG}} \times 100$$

$$(d) \quad \text{INBTOTA} = \frac{\text{IPRA}}{\text{IPFICGCI}} \times 100$$

$$(e) \quad \text{IITOTA} = \frac{\text{IPRA}}{\text{IPPA}} \times \text{IQMS}$$

$$(f) \quad \text{IITOTA} = \frac{\text{IPRA}}{\text{IPPA}} \times \text{IYA}$$

Where,

INBTOTA = Index of Net Barter TOT for Agricultural Sector

IWPA = Index of Wholesale Prices of Agricultural Commodities

IWPM = Index of Wholesale Prices of Manufactured Goods

IPRA = Index of Prices Received by the Agricultural Sector

IPFI = Index of Prices Paid by Agricultural Sector for Farm Inputs

IPFICG = Index of Prices Paid by Agricultural Sector for Farm Inputs, Consumption Goods

IPPFICGCI	=	Index of Prices Paid by Agricultural Sector for Farm Inpus, Consumption Goods and Items of Capital Investment
IITOTA	=	Index of Income Terms of Trade for Agricultural Sector
IPPA	=	Index of Price Paid by the Agricultural Sector
IQMS	=	Index of Quantity of Marketed Surplus of Agricultural Commodities
IYA	=	Index of Yield or Productivity per hectare in Agricultural Sector

Keeping in view of the availability of data on various variables and time constraints, two approaches were used to study the movements in terms of trade for agricultural sector in Rajasthan: Barter TOT and Crop-wise TOT.

Barter TOT for the Agricultural Sector in Rajasthan

This approach is similar to the one that is followed by CACP and a modified version of that recommended by the Task Force on Terms of Trade. The index of Barter Terms of Trade (IBTOTA) was defined as the ratio of index of price received by the agricultural sector for the commodities sold (IPR), to the index of pieces paid by the agricultural sector for farm inputs, consumption goods and items of capital formation (IPP). It was defined as: -

$$IBTOTA = \frac{\text{Index of Prices Received by the Agricultural Sector (IPR)}}{\text{Index of Prices Paid by the Agricultural Sector (IPP)}} \times 100$$

The price situation of the agriculture sector encompasses both the price received by the farmers for the commodities sold by them and the prices paid for the commodities purchased from the non-agricultural sector. The commodities sold by the agricultural sector to the non-agricultural sector can be broadly divided into two groups viz., (i) those sold for final consumption like cereals, fruits, vegetables, milk and eggs; and (ii) those sold for intermediate consumption or to be used as industrial raw materials like oilseeds, cotton and sugarcane.

The commodities purchased by the agricultural sector can be divided into three groups viz., (i) commodities purchased for final consumption like edible oils, sugar, gur and salt (ii) commodities purchased for intermediate consumption like fertilizers, oil-cakes, pesticides, diesel and electricity and (iii) commodities purchased for capital formation like cement, bricks and farm machinery.

The relative movements in the prices of these two sets of commodities indicate the position of Net Barter TOT for the agricultural sector.

In this study, the attempt has been on working out Net Barter Terms of Trade for Rajasthan agriculture. The period selected for this study was 1981-82 to 1995-96. The base period for this study was taken as the triennium ending (TE) 1990-91.

The Barter TOT following the CACP approach were estimated by using following steps:

Construction of Indices of Prices Received by the Agricultural Sector

All crops grown by the farmers of Rajasthan and livestock production in the state are included in the study. As a first step, gross value of output of crops

and the livestock sector for the base period, that is, 1988-89 to 1990-91, were compiled from the records of the Directorate of Economics and Statistics, Government of Rajasthan. The next requirement for constructing a weighted diagram is marketed surplus ratios for various commodities.

Marketed surplus ratios given by the working group on construction of wholesale price indices appointed by the Ministry of Industries, Government of India were used. Making use of these ratios, the values of marketed surplus of each commodity were estimated. The relative share of each commodity in the total value of marketed surplus was used as a weight for that commodity.

The Directorate of Economics and Statistics collects and compiles the farm harvest prices (FHP) and constructs the index numbers. These index numbers are available with 1979-80 to 1981-82 as the base. The base was converted to from TE 1981-82 to TE 1990-91.

For some crops, farm harvest prices are not available so wholesale prices prevailing in major primary markets of the growing areas during the peak marketing months were collected.

The index numbers of prices received by the farmers of Rajasthan for various commodities sold by them, worked out as per the adjustments and process are mentioned earlier are shown in Table 3.1.

Using the weighing diagram and indices of prices received for individual commodities as presented in Table 3.1, the weighted indices of prices received by the farmers of Rajasthan as a group, were constructed. These are shown in Table 3.2. For comparison, the all-India index of prices received by the farmers has been given in Table 3.2.

- (1) During 1980s and 1990s, the rate of increase in price received by the farmers of Rajasthan has been lower than that by the farmers of the rest of India.
- (2) In the Indian context, the changes in IPR have always been positive but in the case of Rajasthan, there have occurred negative changes in 1982-83, 1988-87 and 1992-93.
- (3) During 1994-95 and 1995-96, there has been considerable improvement in the levels of prices received by the farmers in the rest of the country with the IPR going up from 148.24 for 1993-94 to 145.60 for 1994-95 and further to 185.13 for 1995-96. However, the IPR for Rajasthan's farmers increased from 148.85 for 1993-94 to only 151.47 for 1995-96. This happened mainly because the prices received by Rajasthan farmers for their most important crops, viz., rapeseed, mustard, wheat and gram either decreased or increased only marginally.

Construction of Indices of Price Paid by the Agricultural Sector for Consumption Goods

The Directorate of Economics and Statistics, Government of Rajasthan, compiles the prices and constructs the index numbers of wholesale prices of several commodities. The base year for these index numbers is 1952-53. These index numbers were converted to the base TE 1990-91. The index number for 11 commodities that are important consumption goods purchased by the rural households for the period 1981 to 1996 are shown in table 3.3 (Base TE 1990-91).

The weighted indices of prices of consumption goods (based on index number given in Table 3.3 and the weights) are given in column 2 of Table 3.4.

Construction of Indices of Prices Paid by the Agricultural Sector for Farm Inputs

Among the important farm inputs that are purchased by the farmers from the non-agricultural sector, the index numbers for Rajasthan were available for electricity, diesel, fertilizers and insecticides. The weighted indices of prices of farm inputs are shown in column 3 of Table 3.4.

Construction of Index Numbers of Prices Paid by the Agricultural Sector for Items of Capital Formation

The construction of index numbers of prices paid by the agricultural sector for items of capital formation was guided by the availability of index numbers of prices of individual items. These were available for cement, iron and steel and building material. Using weights of these items and the individual price index numbers, the combined indices of prices of items of capital formation were constructed as shown in the fourth column of Table 3.4.

Construction of Index Numbers of Price Paid by the Agricultural Sector for all Commodities Purchased from the Non-Agricultural Sector

The next step was the construction of a combined index of prices paid by the agricultural sector for all three groups of goods, viz., consumption, farm inputs and capital formation. Relative weights as worked out by the Task Force were used to combine the three series of index numbers.

Consumption Goods	73.6
Farm inputs	21.6
Capital Formation	4.8
Total	100

Using these weights, the index numbers of prices paid by the agricultural sector were constructed, as show in the last column of Table 3.4.

Construction of Indices of Barter Terms of Trade for the Agricultural Sector in Rajasthan

The indices of barter terms of trade for the agricultural sector of Rajasthan was constructed as a ratio of prices received by the farmers (from Table 3.1) to the prices paid by them for consumption goods, farm inputs, items of capital formation and combined for all three groups of items purchased from the non agricultural sector. The results are presented in Table 3.5 and in Figure 3.1.

The estimates of barter TOT of Rajasthan agriculture reveal the following: -

- (i) There are considerable inter-year fluctuations in the barter TOT for agriculture.
- (ii) While during the 1980s barter TOT improved, during the 1990s, these deteriorated.

The decline in the index of barter TOT during the 1990s occurred due to rapid increase in the prices of farm inputs and items of capital formation. While the rate of increase in prices paid by the farmers accelerated during the 1990s, the increase in prices received by the farmers was at a lower rate which did not compensate the farmers for the rise in input prices.

Table 3.1: Index Numbers of Prices Received by Farmers of Rajasthan (TE 1990-91 = 100)

Commodities	81 - 82	82-83	83-84	84-85	85-86	86-87	87-88	88-89	89-90	90-91	91-92	92-93	93-94	94-95	95-96
(a) Crops Sector															
Cereals															
Paddy	56.73	54.37	66.66	53.14	90.94	70.53	125.31	97.55	101.80	100.65	143.43	141.31	132.55	157.30	204.63
Wheat	64.75	64.12	64.75	67.73	73.94	72.38	88.95	96.08	90.09	113.84	140.69	129.12	153.19	150.35	164.78
Jowar	65.20	71.56	67.40	69.17	81.16	89.99	97.74	93.01	97.44	109.60	176.29	145.89	164.70	198.04	229.76
Bajra	87.25	83.74	79.40	76.11	103.23	102.30	123.45	81.95	98.45	119.61	200.08	155.04	184.06	201.42	223.78
Barley	58.05	55.12	57.14	61.50	65.81	61.30	88.83	96.97	89.51	113.52	128.06	105.03	166.73	157.50	155.85
Maize	76.12	73.11	68.78	67.50	96.23	97.15	105.05	98.64	94.38	106.98	171.02	144.21	142.10	215.19	206.86
Small Millets	87.25	83.74	78.40	76.11	103.23	102.30	123.45	81.95	94.45	119.61	200.08	155.04	184.06	201.46	233.78
Pulses															
Gram	45.13	42.30	47.65	64.42	58.63	58.15	79.32	91.72	105.69	102.59	102.57	119.13	170.79	133.37	139
Arhar	45.42	50.29	60.93	50.94	53.83	79.1	91.52	95.01	98.82	106.67	141.64	127.41	147.7	206.22	227.35
Urad	40.15	46.93	59.9	75.61	72.83	71.61	91.43	94.7	103.07	102.2	124.45	97.86	124.97	262.63	262.42
Moong	46.96	43.55	45.54	66.46	71.01	56.07	77.13	97.49	101.33	101.19	117.69	116.13	145.59	177.18	194.97
Moth	43.4	32.55	41.59	53.94	78.5	74.28	94.63	151.53	69.61	79.26	102.46	109.39	122.05	152.79	175.09
Choula	43.4	32.55	41.59	53.94	78.5	74.28	94.63	151.13	69.61	79.26	102.46	109.39	122.05	152.79	175.09
Masur	52.63	44.1	48.6	57.7	66.5	65.9	71	90.92	97.9	111.2	125.2	115.7	123.36	131.02	138.65
Matar	45.13	42.3	67.65	64.43	58.63	58.15	79.32	91.72	105.69	102.59	102.87	119.13	170.7	133.27	139
Other Pulses	45.13	42.3	45.65	64.43	58.63	58.15	79.32	91.72	105.69	102.59	102.87	119.13	170.7	133.27	139

Continued...

Commodities	81 - 82	82-83	83-84	84-85	85-86	86-87	87-88	88-89	89-90	90-91	91-92	92-93	93-94	94-95	95-96
Fibres															
Cotton	57.3	57.29	71.4	69.47	65.47	61.88	84.56	100.72	98.49	100.79	135.47	123.31	128.89	95.44	101.14
Mesta	51.77	56.86	85.36	169.7	54.81	56.82	64.64	85.22	102.22	112.55	102.47	91	95.15	99.3	103.45
Sanhemp	68.63	61.2	77.42	83.15	108.56	105.62	143.33	97.64	98.97	103.63	127.1	106.6	159.06	149.51	195.93
Sugarcane															
Sugarcane	85.81	68.94	60.34	63.74	78.91	78.34	78.34	84.49	104.49	109.02	112.76	118.98	193.59	174.47	164.38
Gur	67.56	59.72	48.81	61.92	82.99	78.62	88.93	96.36	103.08	100.56	93.88	118.27	158.77	170.24	184.64
Oil seeds															
Groundnut	57.31	60.13	67.9	63.52	63.3	78.29	102.01	75.92	90.72	133.36	162.4	133.03	140.74	163.62	186.18
Rapeseed&Mustard	59.83	50.33	67.57	51.05	62.32	94	98.39	79.43	97.57	132.01	128.08	124.37	146.26	140.09	154.41
Sesamum	52.94	59.15	63.33	63	60.84	84.84	113.36	82.95	92.8	12402 5	142.7	123.52	134.69	164	201.54
Linseed	49.56	59.58	59.63	66.65	65.93	92.53	97.62	79.06	101.45	119.48	129.9	134.69	146.78	157.59	170.55
Castorseed	51.64	59.68	70.93	56.76	63.39	76.31	106.58	108.54	101.07	90.39	118.55	131.05	160.17	168.03	158.29
Taramira	44.84	58.4	66.57	66.4	68.13	90.38	105.33	79.09	101.85	119.06	131.4	122.89	161.47	159.56	158.97
Soyabean	46.53	44.21	49.56	45	45.32	53.54	90.91	82.04	78.8	113.97	130.51	129.89	139.49	149.09	158.69
Sunflower	52.66	53.5	58.4	57.1	57.3	81.1	94.4	82.5	91.7	125.8	150	128.5	137.38	146.26	155.14

Continued...

Commodities	81-82	82-83	83-84	84-85	85-86	86-87	87-88	88-89	89-90	90-91	91-92	92-93	93-94	94-95	95-96
Condiments & Spices															
Dry Chillies	47.54	50.81	52.44	69.47	75.57	65.67	82.73	129.21	86.63	84.16	202.14	176.29	108.53	172.75	280.58
Ginger	47.21	64.3	110	83.44	35.56	41.85	111.21	117.37	87.96	94.67	103.73	126.15	147.85	194.5	160.19
Turmeric	35.05	62.22	117.4	130.39	117.88	93.13	107.79	90.25	87.11	122.64	194.8	182.48	193.05	203.62	214.19
Coriander	48.75	53.5	58.13	76.38	91.63	140.13	82.38	95.62	101.88	102.5	137.88	104.63	144.13	157	182.13
Garlic	36.14	49.2	55.5	25.69	47.1	207.4	186.7	58.4	72.2	169.5	172	114.3	125.96	137.62	149.48
Cuminseed	69.13	76.82	48.61	53.75	65.29	99.59	150.07	65.42	108.79	125.79	249.52	226.98	235.79	168.94	250.63
Ajwayan	39.98	49.2	82.29	39.73	53.01	122.26	145.51	87.82	86.22	125.95	204.67	128.29	218.33	365.68	292.13
Sounf	69.13	76.82	48.61	53.75	65.29	90.59	150.07	65.82	108.79	125.79	249.92	226.98	235.79	168.94	250.63
Methi	56.01	70.65	64.46	59.97	62.42	111.84	194.94	89.69	118.24	92.07	133.07	145.88	178.83	157.6	173.89
Vegetables & Fruits															
Potato	65.31	74.25	63.02	39.82	104.01	84.37	77.74	92.4	106.85	100.75	161.51	147.73	149.05	184.52	206.8
Sweet Potato	52.11	48.6	58.9	70.8	59.5	91.2	86.8	93.4	103.3	103.8	113.6	143.7	151.56	158.62	166.08
Onion	60.46	79.3	75.6	63	55.7	74.7	115.8	88.3	71.3	141.5	123.9	107.7	114.28	120.86	127.44
Mango	52.88	59.99	60.3	59.72	76.5	86.17	83.23	86.92	95.64	117.46	130.45	134.94	142.71	150.48	158.25
Citrus Fruits	52.88	59.99	60.3	59.72	76.5	86.17	83.23	86.92	95.64	117.46	130.45	134.94	142.71	150.48	158.25
Other Fruits	52.88	59.99	60.3	59.72	76.5	86.17	83.23	86.92	95.64	117.46	130.45	134.94	142.71	150.48	158.25
Tobacco															
Tobacco	56.31	50.59	56.51	58.62	45.58	76.98	68.74	80.88	96.34	122.78	119.94	111.68	207.78	152.4	204.21
Opium	56.31	50.59	56.51	58.62	45.58	76.98	68.74	80.88	96.34	122.78	119.94	111.68	207.78	152.4	204.21

Continued...

Commodities	81-82	82-83	83-84	84-85	85-86	86-87	87-88	88-89	89-90	90-91	91-92	92-93	93-94	94-95	95-96
Miscellaneous															
Guar	73.27	53.8	78.14	52.01	75.83	101.71	169.6	127.07	90.44	82.49	153.2	98.38	159.1	145.77	227.5
Fodder	52.62	59.22	63.87	68.32	74.08	78.04	84.37	93.5	100	106.44	120.71	138.49	145.52	152.55	159.58
(B.) Livestock															
Milk & Milk Prod.	50.4	55.7	61.3	66.8	70.8	74.3	81.8	93.1	101.4	105.4	119.2	133.5	140.56	147.62	154.68
Meat & Meat Prod	49	52.8	55.2	61.8	69.7	82.2	86.5	92.8	99.9	107.3	119.8	134.8	142.39	149.98	157.57
Hides & Skins															
I.) Cattle & Buff. Hid.	53.19	54.1	53.6	63.2	80.2	81.9	95.8	78.2	99	122.7	139	143.2	152.24	161.28	170.32
II.) Goat & Sheepskin	29.13	27	26	37.3	49.5	62	75.6	93.4	98.8	107.8	98.1	89.3	97.19	105.08	112.97
Poultry Meat & Egg															
I.) Poultry Meat	62.66	73.6	78.3	82.5	87.7	86.7	91.1	99.4	101.2	99.3	120.5	143	148.49	153.98	159.47
ii.) Hen Egg	64.39	70.1	74.5	79.2	80.5	84.5	92.4	101.4	95.1	103.6	127.2	141.1	147.13	153.16	159.47
Wool & Hair	63.17	58.4	58.1	56	57.5	91	102.2	97.1	105	98	105.2	102	106.65	111.3	115.95
Dung & Bone	52.62	59.22	63.87	68.32	74.08	78.04	84.37	93.5	100	106.44	120.71	138.49	145.52	152.55	159.58

Source: S. S. Acharya, "Terms of Trade for Agriculture Sector in India at the State Level", 2001, in Indian Agricultural Policy at the Crossroads: Priorities and Agenda, Rawat Publication, New Delhi.

**Table 3.2: Index of Prices Received by Agricultural Sector in Rajasthan
(TE 1990-91=100)**

Year	Rajasthan	India
1981-82	57.44	55.5
1982-83	56.19	58.72
1983-84	62.52	64.64
1984-85	62.67	68.53
1985-86	70.98	68.82
1986-87	80.07	76.25
1987-88	95.41	86.2
1988-89	94.34	90.11
1989-90	96.46	97.42
1990-91	109.19	112.47
1991-92	135.14	129.97
1992-93	129.55	132.72
1993-94	148.85	148.24
1994-95	151.67	165.5
1995-96	169.47	185.13

Source: S. S. Acharya, "Terms of Trade for Agriculture Sector in India at the State Level", 2001, in Indian Agricultural Policy at the Crossroads: Priorities and Agenda, Rawat Publication, New Delhi.

Table 3.3: Index Number Of Wholesale Prices Of Consumption Goods In Rajasthan [1988-90=100]

Commodities	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Vanaspati	46.82	50.83	54.45	57.82	60.34	67.26	85.82	86.40	92.93	120.68	132.96	132.12	115.76	120.35	127.98
Edible Oil	57.03	47.98	62.04	64.98	59.96	71.09	99.39	91.38	88.26	120.35	140.65	135.15	128.00	135.21	150.12
Sugar & Gur	78.45	69.96	65.76	65.86	82.65	82.46	77.80	81.44	103.92	114.65	116.98	114.65	160.91	185.63	176.68
Tea & Coffee	39.96	46.79	67.09	76.40	62.93	67.33	69.33	73.04	106.49	120.47	109.56	120.75	135.62	154.20	168.70
Tobacco Product	46.63	46.53	49.84	51.94	57.40	62.15	72.32	85.19	98.80	116.01	127.15	140.95	146.18	160.49	176.06
Kerosene	73.77	77.68	82.74	82.31	87.37	96.91	97.49	97.49	97.49	105.01	119.34	113.69	114.85	117.17	117.60
Cotton Textile	65.04	69.35	80.55	82.39	82.86	88.16	93.36	97.27	98.27	104.37	122.88	136.19	170.41	175.12	175.12
Woolen Textile	69.19	69.19	69.19	68.73	74.28	88.72	96.23	97.73	97.73	104.54	131.34	148.90	164.73	165.88	165.88
Manuf. of Textile	58.04	58.97	61.87	70.63	75.04	74.46	83.28	92.16	97.56	110.27	115.26	118.11	135.69	168.89	186.54
Soap & Detergent	87.51	89.12	90.45	91.52	91.52	91.52	91.52	93.93	100.89	105.17	110.26	132.74	132.74	132.74	132.74
Medicine	70.27	73.37	75.69	78.36	83.06	85.95	90.30	96.21	98.66	105.13	112.09	119.82	131.13	155.02	165.35
All Commodities	58.05	59.31	64.10	68.88	74.84	76.56	85.04	95.15	98.13	106.71	132.53	146.52	150.64	165.03	170.26

Source: S. S. Acharya, "Terms of Trade for Agriculture Sector in India at the State Level", 2001, in Indian Agricultural Policy at the Crossroads: Priorities and Agenda, Rawat Publication, New Delhi.

Table 3.4: Index Numbers of Prices Paid by Agricultural Sector for Goods Purchased from the Non-Agricultural Sector in Rajasthan (TE 1990-91 = 100)

Index of Prices Paid for				
Year	Consumption Goods	Farm Inputs	Capital Formation	All Goods
Weights	73.6	21.6	4.8	100
1981-82	64.57	70.55	49.18	65.12
1982-83	64.17	73.95	57.56	65.97
1983-84	69.95	76.51	62.92	71.03
1984-85	72.8	85.49	66.58	75.08
1985-86	77.57	88.83	73.89	78.5
1986-87	79.58	92.01	74.07	82
1987-88	85.02	95.3	72.63	86.65
1988-89	88.19	97.28	75.05	90.06
1989-90	99.48	98.07	93.2	98.88
1990-91	111.6	104.65	131.76	111.07
1991-92	119.6	228.18	161.75	158.04
1992-93	126.55	388.51	181.91	185.79
1993-94	145.22	261.21	175.11	171.71
1994-95	160.48	155.4	172.29	159.95
1995-96	165.99	242.47	200.9	184.84
1996-97	169.87	269.77	210.92	193.42

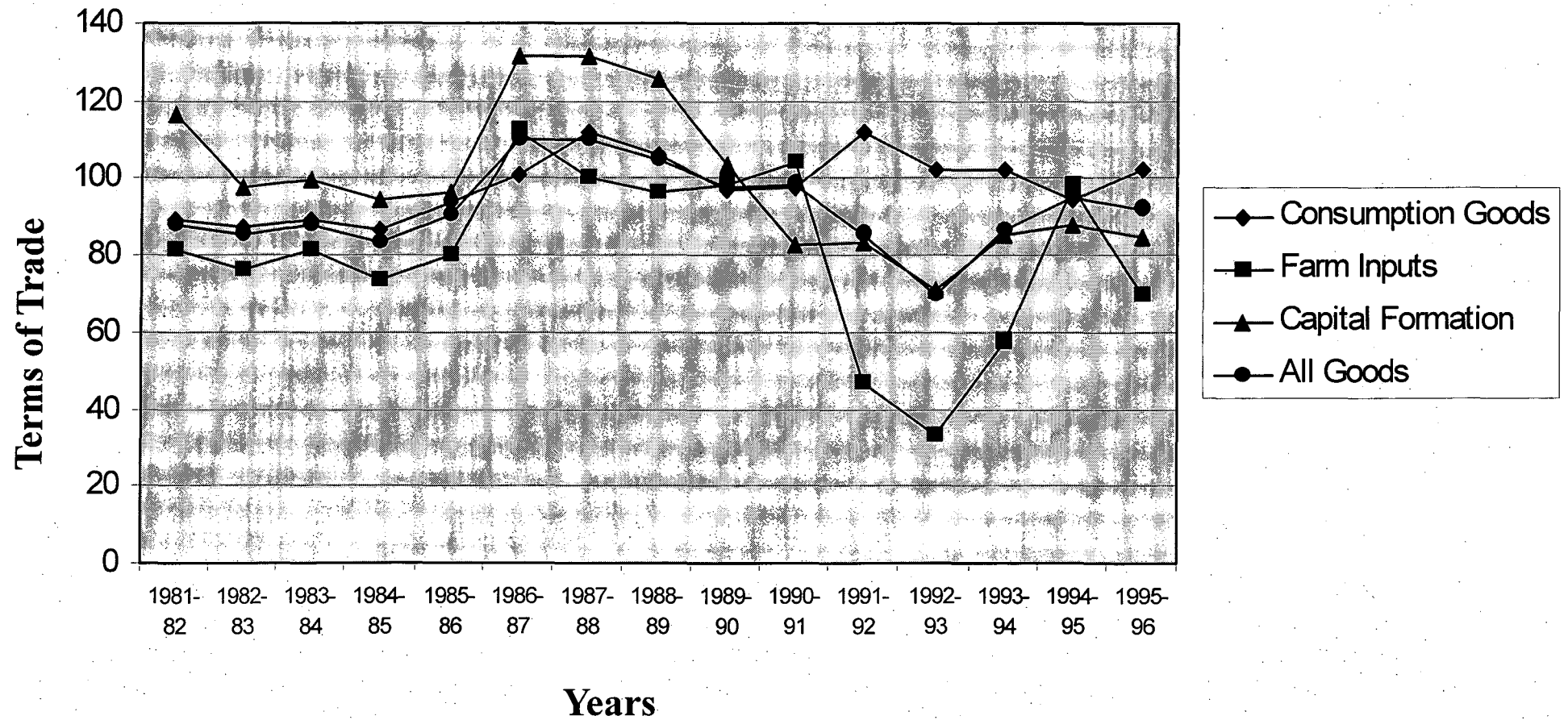
Source: S. S. Acharya, "Terms of Trade for Agriculture Sector in India at the State Level", 2001, in Indian Agricultural Policy at the Crossroads: Priorities and Agenda, Rawat Publication, New Delhi.

Table 3.5: Index Numbers of Barter Terms of Trade for Agricultural Sector for Rajasthan

Year	Index of Prices Received	Index of Prices Paid for				Barter Terms of Trade With Respect to			
		Consumption of Goods	Farm Inputs	Capital Formation	All Goods	Consumption Goods	Farm Inputs	Capital Formation	All Goods
1981-82	57.44	64.57	70.55	49.18	65.12	88.96	81.42	116.8	88.21
1982-83	56.19	64.17	73.95	57.56	65.97	87.56	75.95	97.62	85.18
1983-84	62.52	69.95	76.51	62.92	71.03	89.38	81.72	99.36	88.02
1984-85	62.67	72.58	85.49	66.58	75.08	86.35	73.31	94.13	83.47
1985-86	70.98	75.77	88.83	73.89	78.5	93.68	79.91	96.06	90.42
1986-87	80.07	79.58	92.01	74.07	82	100.62	87.02	108.1	97.65
1987-88	95.41	85.02	95.3	72.63	86.65	112.22	100.12	131.36	110.11
1988-89	94.34	88.91	97.48	75.05	90.06	106.11	96.98	125.7	104.75
1989-90	96.46	99.48	98.07	93.2	98.88	96.96	98.36	103.5	97.55
1990-91	109.11	111.6	104.65	131.76	111.17	97.84	104.34	82.87	98.31
1991-92	135.54	119.6	288.18	161.95	158.04	112.29	46.89	83.45	85.51
1992-93	129.55	126.55	388.51	181.91	185.79	102.37	33.35	71.22	69.73
1993-94	148.85	145.32	261.21	175.11	171.71	102.5	56.99	85	86.69
1994-95	158.67	160.48	155.4	172.29	159.95	94.51	97.6	88.03	94.82
1995-96	169.47	165.99	242.47	200.9	184.18	102.1	69.89	84.35	92.01
1996-97	NA	169.87	269.77	210.92	193.42	NA	NA	NA	NA

Fig. 3.1

Barter Terms of Trade for Agricultural Sector in Rajasthan.



Crop-wise TOT for the Agricultural Sector in Rajasthan

The selection of the crops was done on the basis of their importance in the cropping pattern of the state during the base period (TE 1990-91) and the availability of estimates of cost of production.

Basically, two variants of barter TOT for each crop were worked out.

These are:

$$(g) \quad IBTOTC = \frac{IFHP}{IPPI} \times 100$$

$$(h) \quad IBTOTC = \frac{IFHP}{IPPCG} \times 100$$

where,

IBTOTC = Index of Barter TOT for a Crop

IFHP = Index of Farm Harvest Prices of a Crop

IPPI = Index of Price Paid for Purchased Farm Inputs

IPPCG = Index of Price Paid for Consumption Goods

The TOT ratios were estimated in several steps:

Selected crops available are:

Bajra, Maize, Wheat, Barley,
Gram, Rapeseed-Mustard, Cotton,
Sesamum

Farm Harvest Prices Available

Moong

Farm Harvest Price Not Available

Construction of Index Numbers of Farm Harvest Prices

The farm harvest prices of the selected crops for the period 1980-81 to 1995-96 for the state were collected from the publications of the Directorate of Economics and Statistics, Ministry of Agriculture, Government of India. The data on farm harvest prices were used to construct index numbers of farm harvest prices with TE 1990-91 the base. These index numbers which have been used as the numerator for construction of crop wise barter TOT are given in Table 3.6.

The index numbers reveal the behaviour of prices received by the farmers across the state and crops.

Construction of Index of Prices Paid by the Agricultural Sector for Inputs Purchased from the Non-Farm Sector (IPPI)

The first step in construction of IPPI was to ascertain the availability of estimates of cost of cultivation/production for the selected crops from the comprehensive scheme on cost of production being operated by the Directorate of Economics and Statistics, Government of Rajasthan. The farmers purchase several inputs in the production of agricultural commodities, some of which like seeds, farm, yard manure, fodder and feeds which are produced within the agricultural sector. However, fertilizers and insecticides are purchased from the non-agricultural sector. Farmers also purchase electricity, diesel, repair services and canal water from the non-farm sectors. The estimates of expenditure on these items, as available from cost studies form the latest two to five years, were used to work out crop-wise weights for these farm inputs.

The second step was the identification of price indicators for each of these inputs. The index numbers of wholesale prices of fertilizers pesticides,

diesel LSD, electricity and non-electric machinery as constructed by the Ministry of Industries, Government of India, were used. The index numbers of prices paid by farmers for farm inputs for the important crops of Rajasthan are given in Table 3.7.

Construction of Index of Prices Paid for Consumption Goods

The index numbers of prices of good purchased by the farmers for final consumption were constructed in the following steps:

- (a) Preparation of weighted diagram
- (b) Identification of price indicators
- (c) Construction of combined index of prices of consumption goods

For construction of the weighted diagram, farming household consumption patterns for the year 1993-94 for Rajasthan as estimated by the NSSO were collected. The following items of consumption were selected;

Commodity	% of Total Expenditure
(a) Vanaspati	0.5
(b) Edible oil	10.6
(c) Sugar and gur	19.8
(d) Tea and Coffee	10.6
(e) Tobacco products	11.8
(f) Kerosene	2.4
(g) Cloths	16.6
(h) Readymade wears	2.3
(i) Soaps	7.3
(j) Medicine	18.1
Total	100

The estimates of monthly per capita expenditure on these items, by rural households during 1993-94 were used to work out the relative weights. With regards to price indicators, the Directorate of Economics and Statistics, Government of Rajasthan compiles the prices and constructs the index numbers of wholesale prices of several commodities. The base period for the index numbers was converted to TE 1990-91. Using the weights and index numbers of prices with base TE 1990-91 the index numbers of prices paid by rural household for goods of household consumption purchased from the non-farm sector worked out.

Crop-wise Index of TOT with respect to Prices of Purchased Inputs

The crop-wise index numbers of TOT derived as a ratio of index of farm harvest prices to the index of purchased farm inputs are shown in Table 3.8.

- a) There have been larger inter-year fluctuations in the TOT for wheat.
- b) The TOT for maize and barley improved during the 1980s as the average of index numbers of TOT for the second half of the 1980s was considerably higher than that for the first half of the 1980s. But the TOT for bajra was lower during the second half of the 1980s.
- c) For gram, there was even some deterioration in the TOT during the first half of the 1990s.
- d) There have been larger inter-year fluctuations in the TOT for mustard. It improved during the second half of the 1980s and show a sharp decline during the first half of the 1990s.
- e) For cotton, there was an increasing trend in the TOT but in 1990-91 it deteriorated.

Crop-wise Index of TOT with respect to Prices of Consumption Goods

Crop-wise indices of TOT with respect to prices of consumption goods derived as ratios of farm harvest prices to the index of prices of consumption goods purchased by the farmers are given in Table 3.9.

For comparison of this series of index numbers of TOT with that worked out on the basis of prices paid for farm inputs, compound growth rates are shown in Table 3.10. The observations from this table are:

- (a) The rate of growth of farm harvest prices have been higher than that of prices of farm inputs and prices of consumption goods separately for all the crops of Rajasthan.
- (b) The rate of increase in prices of purchased inputs has been lower than that of consumption goods purchased by the farmers. This implies that the rate of increase in TOT with respect to prices of purchased inputs have been higher than in TOT with respect to prices of consumption goods.
- (c) The rate of growth of indices of TOT for all crops has been positive.

In the present chapter main focus of the study is on Net Barter TOT and Crop-wise TOT. All the outcomes have been discussed in this chapter. Three main aspects of the behaviour of TOT are analyzed here.

Table 3.6: Index Number of Farm Harvest Prices of Important Crops (TE 1990-91 100) in Rajasthan

Crops	81-82	82-83	83-84	84-85	85-86	86-87	87-88	88-89	89-90	90-91	91-92	92-93	93-94	94-95	95-96
Bajra	86.98	83.67	79.27	75.97	102.94	102.39	13.31	82.02	98.54	119.45	199.82	154.68	83.86	200.92	233.4
Maize	76.14	73.1	69.04	67.51	96.45	96.95	105.08	98.48	94.42	107.11	171.07	144.16	142.13	215.23	207.11
Wheat	64.6	64.23	64.6	67.52	73.72	72.26	88.69	95.99	90.15	113.87	140.51	128.83	152.92	150.36	164.6
Barley	57.95	55.07	57.12	61.64	65.75	61.23	88.77	96.99	89.59	113.43	128.63	105.21	166.85	157.81	156.17
Gram	45.11	42.35	47.7	64.41	58.57	58.09	79.34	91.67	105.79	102.54	102.87	119.09	170.69	133.37	139.05
Mustard	59.83	50.29	67.63	51.01	62.28	94.08	98.41	79.48	97.54	122.98	128.03	124.42	146.24	140.32	154.34
Cotton	n.a.	81.87	86.66	111.37	86.85	85.19	173.51	126.86	117.46	55.69	200.98	197.11	199.51	295.76	313.46
Sesamum	52.92	59.16	63.28	62.99	60.79	84.85	111.31	82.93	92.81	124.26	142.67	123.01	134.71	163.95	201.53

Table 3.7: Crop wise Index Number of prices paid for Farm Inputs in Rajasthan (TE 1990-91=100)

Crops	81-82	82-83	83-84	84-85	85-86	86-87	87-88	88-89	89-90	90-91	91-92	92-93	93-94	94-95	95-96
Bajra	64.03	67.42	70.04	72.29	76.91	81.6	85.65	92.79	99.09	108.11	124.21	139.21	149.81	159.49	168.39
Maize	88.78	93.37	90.81	90.87	93.72	100.11	102.55	98.4	99.2	102.44	123.41	152.39	172.91	184.8	196.84
Wheat	75.48	79.61	81.12	81.79	85.11	91.07	96.45	97.09	98.02	104.89	121.03	140.65	161.43	171.01	179.1
Barley	72.35	76.39	78.97	79.73	83.13	89.04	95.31	96.96	97.63	105.41	120.17	137.42	158.84	167.65	174.62
Gram	68.81	72.74	76.6	77.43	80.88	86.77	94.17	96.9	97.14	105.98	119.04	133.56	155.98	163.64	169.33
Mustard	76.38	80.51	81.51	82.24	85.62	91.51	96.31	96.86	98.29	104.82	121.7	142.28	162.02	172.03	180.77
Cotton	75.52	80.82	82.82	84.32	86.78	90.88	94.5	95.63	99.36	104.99	128.12	142.63	156.99	198.63	196.49
Sesamum	63.25	66.46	68.18	70.99	76.05	80.25	82.61	91.17	100.04	108.79	126.65	142.7	148.26	159.2	169.75

Table 3.8: Cropwise Terms of Trade wrt Prices of Purchased Inputs in Rajasthan(TE 1990-91=100)

Crop	81-82	82-83	83-84	84-85	85-86	86-87	87-88	88-89	89-90	90-91	91-92	92-93	93-94	94-95	95-96
Bajra	135.84	124.11	113.18	105.09	133.84	125.48	143.97	88.39	99.44	110.49	160.88	111.12	122.73	125.98	138.61
Maize	85.76	78.29	76.02	74.3	102.91	96.85	102.46	100.08	95.18	104.56	138.62	94.6	82.2	116.47	105.22
Wheat	85.58	80.69	79.63	82.55	86.62	79.35	91.95	98.86	91.97	108.56	116.1	91.6	94.73	87.93	91.9
Barley	80.09	72.09	72.34	77.32	79.1	68.77	93.14	100.03	91.77	107.6	107.04	76.56	105.04	94.13	89.43
Gram	65.55	58.22	62.27	83.19	72.42	66.94	84.25	94.6	108.9	96.76	86.41	89.1	109.43	81.5	82.12
Mustard	78.33	62.46	82.97	62.03	72.74	102.8	102.18	82.06	99.24	117.32	105.21	87.45	90.26	81.57	85.38
Cotton	n.a.	101.3	104.64	132.08	100.08	93.74	183.61	132.66	118.21	53.04	156.87	138.2	127.08	148.9	159.53
Sesamum	83.67	89.01	92.81	88.73	79.93	105.73	134.75	90.77	92.77	114.22	112.65	86.2	90.06	102.98	118.72

Table 3.9: Cropwise terms of trade wrt Price of Consumption Goods in Rajasthan (TE 1990-91= 100)

Crop	81-82	82-83	83-84	84-85	85-86	86-87	87-88	88-89	89-90	90-91	91-92	92-93	93-94	94-95	95-96
Bajra	143.92	138.46	119.23	105.77	138.81	131.9	147.81	92.04	97.9	108.36	168.89	121.55	130.12	125.91	137.68
Maize	125.99	120.96	103.84	94	130.05	124.9	125.96	110.51	93.81	97.16	144.58	113.28	100.59	134.87	122.17
Wheat	106.89	106.29	97.16	94.01	99.41	93.09	106.31	107.71	89.57	103.29	118.76	101.23	108.23	94.23	97.09
Barley	95.88	91.13	85.92	85.83	88.66	78.88	106.41	108.83	89.01	102.89	108.72	82.67	118.09	98.89	92.12
Gram	74.64	70.08	71.75	89.69	78.98	74.83	95.11	102.87	105.11	93.02	86.94	93.58	120.8	83.58	82.02
Mustard	98.99	83.22	101.72	71.03	83.98	121.19	117.97	89.19	96.92	111.56	108.21	97.77	103.5	87.93	91.04
Cotton	n.a.	135.48	130.35	155.07	117.11	109.74	207.99	142.36	116.7	50.51	169.87	154.88	140.2	185.34	184.9
Sesamum	87.57	97.89	95.18	87.71	81.97	109.31	133.43	93.06	92.21	112.72	120.58	96.66	95.34	102.74	118.88

Table 3.10: Cropwise Compound Growth Rates of Prices Received, Prices Paid and Their Ratios in Rajasthan (1981-82 to 1995-96)

Crop	Farm Harvest Prices (FHP)	Index of Prices Paid for farm inputs (PFI)	Index of Prices Paid for Consumption Goods (PCG)	Ratio of FHP to PFI	Ratio of FHP to PCG
Bajra	7.94	6.84	8.04	1.37	0.29
Maize	8.15	6.33	8.04	2.22	0.49
Wheat	7.9	7.53	8.04	0.28	0.25
Barley	8.95	6.97	8.04	2.16	1.23
Gram	10.01	7.12	8.04	2.98	2.21
Mustard	8.52	6.82	8.04	1.93	0.83
Cotton	9.84	6.99	8.04	2.32	1.83
Sesamum	9.37	7.65	8.04	1.41	1.62

Changes in the Divergence of TOT for the Agriculture Sector across the States during 1981 to 1996.

The state-level crop-wise index of TOT with respect to prices of purchased inputs reveal that the TOT for all the crops in almost all the states reveal inter-year fluctuations. The TOT for wheat in all the states recorded an increasing trend and these have remained lower in Bihar and Punjab and higher in Gujarat and Rajasthan than in other wheat growing states. For coarse cereals, the TOT in almost all the states revealed an increasing trend and these have remained relatively better in Gujarat and Rajasthan than in other states. The TOT for oilseeds improved during the second half of the 1980s and deteriorated during the 1990s in all oilseeds growing states including Rajasthan because different programmes to improve production of oilseeds were implemented during 1980s. As a result, farmers got more money and TOT improved, subsequently. However, due to liberalization in the 1990s prices of oilseeds went down, and consequently TOT for oilseeds also deteriorated in the said period.

Impact of Liberalization of Trade on the TOT for Agriculture

In early 1990s, when liberalization started in India, states with more production of oilseeds and pulses suffered deterioration in TOT while TOT for the states producing more of wheat and rice improved because farmers got more money for these exportable crops.

Across regions, the TOT for agriculture of central and some southern states also worsened. The weightage of oilseeds in the central region (Gujarat, Madhya Pradesh, Maharashtra and Rajasthan) was 26.4 per cent and in the Southern region also this worsened owing to the decline in the prices of pulses

as a consequence of trade liberalization. This was notwithstanding the fact that the TOT of all the regions had somewhat improved owing to the rise in price levels of rice and wheat.

Impact of Changes in TOT on the Growth of the Agricultural Sector

A number of scholars have studied the impact of TOT on agriculture growth. According to Thamarajakshi, TOT do not cause significant impact on output, while according to Mishra and Hazell, TOT exert favourable impact on growth of agricultural output.

In the last few years, a study on the impact of TOT in ten states reveals that 60 per cent of the cases have significant positive impact on agricultural output while 40 per cent cases did not show any impact on output.

In Rajasthan, which topped in terms of growth of output, TOT did not have significant influence on SDP from agriculture. This was due to the fact that some real factors have been at work which have been promoting agricultural growth. These include adoption of the HYV technology, increase in the use of modern agricultural input, expansion in irrigated areas, and so on.

Notes to Chapter 3

- 1) All of the major selected crops could not be studied due to non-availability of data in farm harvest prices and/or estimates of cost of production.
- 2) The weights for each crop and state were reported in Acharya (1999).
- 3) The indices and process received by the agricultural sector of Rajasthan were recently constructed by Acharya and Jogi (1999). We have used their results for this part of the present study which is gratefully acknowledged.

CONCLUSION

Agriculture is not only a primary sector but also a dominant sector of the underdeveloped economy. Economic development of a particular region is characterized by a substantial increase in the production and demand for agricultural products. The economy of Rajasthan is characterized by frequent droughts, inadequate irrigation facilities, environmental degradation and lack of economic and social infrastructure. The present study attempted to explore the production and productivity trends, cropping pattern changes, institutional credit and terms of trade in agriculture.

As a pre-dominantly an agrarian state, agriculture and its allied sector dominate the state economy in Rajasthan. The achievements of agricultural planning in Rajasthan can be appreciated through the progress made in the fields of land development, high yielding varieties, irrigation, fertilizers, plant protection material and the levels of production and productivity. Agricultural planning plays a vital role in the development of agriculture in Rajasthan. The government uses strategies and programmes such as the National Pulses Development Project (NPDP), Oilseeds Production Programme (OPP), Special Food Production Programme (SFPP), and Dry Land Farming for increasing agricultural production and productivity. Increasing agricultural production has always been one of the objectives of the plans in Rajasthan. Although the government already played a vital role in the development of the agriculture sector before the green revolution, it laid even greater emphasis on this sector after the green revolution.

In the Fifth Five-Year Plan, the integrated area approach was adopted where planning of various agricultural inputs was accompanied by the concept of improved crop management practices through Training and Visit (T & V) systems. In the Sixth Plan, input programmes to minimize adverse atmospheric effects on agriculture production were further accelerated. During the Seventh Plan, it was envisaged to increase irrigated area, and to increase use of improved seeds, and of fertilizers and pesticides, as also to adopt dry farming practices. Specific attention was paid to land management, adoption of dry farming technologies, reclamation of degraded lands during the Eighth Plan. In the Ninth Plan, natural endowment constraints like climate, problematic soil, saline water, arid land continued to influence the growth of agriculture sector.

The land utilization data reveals that there is a sizeable increase in the utilization of culturable and irrigated land. Area under forests has also been increased.

The data regarding area, production and productivity of different crops show that there has been a sizeable increase in the area, production and productivity of cereals, pulses and oilseeds. The case of coarse cereals, however, is disappointing. The combined area under jowar, bajra and maize declined in percentage terms from 1950-51 to 2001-2002. High yielding varieties can yield three to seven times more than traditional varieties but most of them are location-specific and are susceptible to pests and diseases. Moreover, low rates of profit, low value status and restricted demand as they are produced and eaten by poor people limit their absorption capacity for yield-enhancing high-cost inputs like chemical fertilizers. Coarse cereals also face competition from superior cereals like rice and wheat. As a consequence of all these factors, the area under coarse cereals in Rajasthan has decreased. The

area under cereals declined from 56 per cent in 1951-56 to 45 per cent in 2001-2002.

With the launching of the Technology Mission on Oilseeds during the mid-1980s, the area under oilseeds has expanded significantly. It increased from 14.9 lakh hectares during 1980-85 to 31.1 lakh hectares during 2001-2002. In fact, the period of the last one and a half decades has seen a marked shift in favour of oilseeds as the pressure of edible oil import forced a conscious decision on the part of the government to achieve self-sufficiency in edible oils by 1990.

The share of non-food crops has also been increasing. This shift in crops from food crops to non-food crops was mainly due to crop planning and higher prices of these non-food crops or cash crops. It reflects a change from food grain cropping to commercial cropping. Nevertheless, the importance of food crops as compared to non-food crops has not declined because of two important reasons. First, prices of food crops have been rising quite fast and the farmers have started growing food crops for the market, in the same way as they grow oilseeds and cotton. Second, the cultivation of food crops has become highly remunerative and productive under the impact of the new technologies. Farmers take into account such considerations when they plan for crops. The shift from food crops to non-food crops therefore, reflects improvements in the present crop pattern and agricultural planning in Rajasthan.

The study shows that during the pre-green revolution period, increase in the growth rate of agricultural production was registered due to expansion in the area under cultivation and because of double cropping and reclamation of culturable wasteland. During the post-green revolution period, however, increase in the growth rate of agricultural production was registered due to use

of modern technology in agriculture as well as the increase in area under cultivation.

The various factors affecting cropping pattern, production and productivity include irrigation facilities, improved seeds, fertilizers, farm size, harvest price, availability of agricultural inputs, nature of land tenure and availability of agricultural credit. Agricultural credit is an important factor among those affecting cropping pattern, production and productivity. Therefore, this study discussed formal credit sources including institutional credit. Co-operatives, commercial banks and regional rural banks are the sources of institutional credit. At the time of Independence, the most important sources of agricultural credit were the moneylenders. But after independence, attempts to free agriculturists from the clutches of the moneylenders were greatly aided by the expansion of institutional credit to agriculture. Besides nationalizing commercial banks, the government also helped cooperatives in a number of ways to expand their operations. In 1975, Regional Rural Banks were established to meet specifically the requirements of agriculture credit.

As a result of the efforts undertaken by the government to expand the institutional source of finance, the importance of moneylenders in agriculture credit has declined significantly while cooperatives and banks have increased their share in agriculture credit considerably. As the study shows, that the number of members of primary agricultural credit societies who availed of loans during the year 2001-2002 was 13.34 lakhs while it was 6.84 lakhs during 1990-91. But according to K. P. Agrawal, it is the large landowners who have received greater benefits from cooperatives. Only 30 per cent of the farmers holding less than 1 hectare are members of PACS whereas almost all

the farmers holding above 4 hectares are members of PACS at the national level.

Advances to agriculture were around 50 per cent of total advances during the last decade for RRBs, while it decreased from 25 per cent to 20 per cent during the last decade for commercial banks. It improved during the period 2001-2003 for commercial banks. At all India level, all through the 1990s, the share of agriculture credit in total bank credit averaged only 13-14 per cent – less than the target of 18 per cent set by the RBI.

Therefore, the governments have been of the view that the full potential of agriculture as a profitable activity must be realized at the earliest to benefit the farmers. Among the factors that will help in realizing this full potential are access to institutional credit for more farmers and appropriate quantity and quality in the agriculture sector. Lending institutions must view agriculture as a sector where there are commercial opportunities for banks to lend and earn reasonable profits.

After carefully considering the above aspects, the central government has reached the following conclusions:

In 2003-2004, the total flow of agricultural credit from all lending institutions has been estimated to be Rs. 80,000/- crore. Action plans prepared by the lending institutions indicate that this will be enhanced to about Rs. 105000 crore in 2004-2005. This will represent a 30 per cent increase over the flow of credit in the previous year. The break up among the different leading institutions will be:

a) Commercial Banks	Rs. 57,000 crores
b) Regional Rural Banks (RRB)	Rs. 8,500 crores
c) Co-operatives	Rs. 39,000 crores

Cropping pattern is one among several factors that influence the differences in the terms of trade for agriculture among different states. Therefore, the need for state level estimates of terms of trade arose. Two approaches were used to estimate the terms of trade for agricultural sector in Rajasthan – Barter Terms of Trade and Crop Wise Terms of Trade. In the first approach, it was found that TOT improved during the 1980s and deteriorated during the 1990s, it improved during 1980s because different programmes to improve production of different crops especially cash crops were implemented. It deteriorated during 1990s due to a very slow increase in the prices of two major commodities of Rajasthan, namely, mustard and gram as well as a rapid increase in the prices of farm inputs and items of capital formation.

In the second approach, crop-wise terms of trade ratios were worked out for the important crops of Rajasthan. In this approach, TOT with respect to prices of consumption goods and TOT with respect to prices of farm inputs were derived. The results show the rates of increase in TOT with respect to prices of consumption goods. The study also found an interesting result, namely, that TOT do not cause significant impact on output in Rajasthan, while some other factors promote agricultural growth such as HYV technology, expansion in irrigated area, and increase in the use of modern agricultural inputs.

To conclude, for the last two decades, things have been rapidly changing and a vast economic and social infrastructure has been created which is steadily changing the shape of Rajasthan's agriculture. The problems faced by the state's agriculture are centuries old, and these can not be set right in the short term. Rajasthan's ambitious programmes to tackle these problems, should in the coming years, result in substantial progress in agriculture.

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