Study No. 173

PROBLEMS AND PROSPECTS OF OILSEEDS PRODUCTION IN WEST BENGAL

DEBAJIT ROY

FAZLUL HAQUE KHAN

AGRO-ECONOMIC RESEARCH CENTRE

VISVA-BHARATI

SANTINIKETAN

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PREFACE

The present study entitled "*Problems and Prospects of Oilseeds Production in West Bengal*" was undertaken at the instance of the Directorate of Economics and Statistics, Ministry of Agriculture, Government of India, Krishi Bhavan, New Delhi as a coordinated study, where the task of coordination has been entrusted with the Centre for Management of Agriculture (CMA), Indian Institute of Management (IIM), Ahmedabad. This report has been an individual centre's report on the study concerned carried out in West Bengal and prepared by our centre, AERC, Visva-Bharati, Santiniketan.

Given the competing demands on agricultural land from various crops, the production or oilseeds can be increased only if productivity is improved significantly and farmers get remunerative and attractive prices. It is here that the present study attempts to examine trends and pattern of growth of different edible oilseeds over time and to identify major constraints in the edible oilseed cultivation.

The study has been primarily entrusted with Mr. D. Roy and Mr. F. H. Khan, while Mr. Md. A. Fazal, Mr. S. Kulkarni, Mr. K. P. Paul, Mr. S. Banerjee, Mrs. P. Dey and Ms. S. Sadhu provided immensely valuable assistance in data collection and processing under the active supervision of the undersigned. Extensive support has also been obtained from Mr. D. Mondal, Mr. A. R. Patra, Mr. M.A. Khaleque, Mr. P. Hazra, Mr. N Maji, Mr. S. Sadhu and also Mr. S. Hemram. I offer my deepest thanks to all of them.

On behalf of this centre, the undersigned takes the opportunity to thank the coordinating center (CMA, IIM-Ahmedabad) for their painstaking work on coordination of this immensely important study across the individual centers, especially for organizing the entire study design with detailed chapterization and table formats and valuable comments.

Sd/-

Santiniketan
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(S. Chakrabarti)
Hony. Director
A.E.R.C., Visva-Bharati

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Introduction

1.1 Backdrop of the Study

On the oilseeds map of the world, India occupies a prominent position, both in regard to acreage and production. India contributes about 10 percent of the world oilseeds production, 6-7% of the global production of vegetable oil and protein meal and is the 4th largest edible oil economy in the world. This sector has also an important position in the India agricultural sector covering an area of about 26.8 million hectares, with total production of about 27.9million tones in Triennium Ending(Te) 2010-11(GOI,2011).This constitutes about 14.9 percent of the gross cropped area in the country. The oilseeds accounted for about 9.7 percent (at 2004-05 prices) of the total value of output from agriculture in TE 2009-10 (CSO 2011).

India was self- sufficient in edible oilseeds and oils till the mid-60s and was a substantial export earner through export of oilseeds, meals extractions and edible oils. With stagnation in production as well as rise in population, the oilseed production fell short of its demand in the early seventies. By the mid-80s, edible oils was the largest import item ,constituting about 30 percent of the total supply, next only to petroleum products despite the fact that India had the world's second largest area under oilseeds. This was a matter of serious concern for the Government and a decision was taken to achieve self-sufficiency in edible oilseeds by 1990s.The initial strategy to overcome stagnant oilseed production was to promote technological change in oilseed production and processing through centrally sponsored schemes. As a result of major initiatives in mid-1980s onwards the production of oilseeds in the country increased during the recent years and reached a level of about 27.9 million tonnes in TE 2010-11. The annual compound growth rate in oilseeds production was negative (-1.96%) between 1994-95 and 2000-01 but improved significantly (6.85%) during the 2000s. The average productivity increased from 872 kg/ha in TE 2000-01 to 1042 kg/ha inTE2010-11. However, the productivity levels of oilseeds in the country are still very low compared to world average and other countries. The yields remain low largely on account of dependence on dry-land farming. The production of oilseeds has not been able to keep pace with the demand for edible oil requirement.

Given the competing demands on agricultural land from various crops, the production or oilseeds can be increased only if productivity is improved significantly and farmers get remunerative and attractive prices. However, farmers face various constraints in oilseeds production. Most of oilseeds are grown under rain-fed conditions and only 28 percent of are under oilseeds is irrigated. Several abiotic, technological, institutional, and socio-economic constraints inhibit exploitation of the yield potential crops and need to be

addressed. Taking into account the changing policy environment, increasing demand, concerns about slow growth in domestic production and rising imports, the present study attempts to analyze performance and potential of Indian oilseeds and oil palm sector and identify major problems/ constraints facing the sector.

1.2: Role of Agriculture in the State

West Bengal happens to be the 3rd biggest economy in India. The main contributing factor in economy and business of this Indian state is agriculture and it is the main occupation of the people of West Bengal. In the year 2009 and 2010 agriculture sector contributed a total of 18.7 percent to the state's total GDP. The major portion of the people residing in West Bengal is either cultivators or agriculture labors. Nearly three out of every four persons is directly or indirectly involved in agriculture. Agriculture Sector is one of the most significant parts of economy and is poised to be the keystone for economic growth and social development in the state. The agriculture, forestry, and fishing industry sector plays a vital role in economy development.

Nearly 72 per cent of the West Bengal's population is living in the rural areas and agriculture is the predominant occupation in the state. The total reporting area of this state is 86.84 lakh hectares, of which 52.96 lakh hectares is the Net Sown Area (61 per cent of the total reporting area). The Gross Cropped Area is 97.52 lakh hectares with a cropping intensity of 184 per cent. Agriculture in West Bengal is small farmer centric with 90 per cent of the cultivators being small and marginal farmers. Small and marginal farming communities hold 84% of the state's agricultural lands. Marginal operational holdings (less than 1 hectare) account for 88.8 percent of the total operational holdings as against 69.8 percent at all India level.

The cropping pattern of this state is dominated by food crops which account for about 78 per cent of the area under principal crops. Rice is cultivated in 58.48 lakh hectares (production of 161.48 lakh MT) followed by Cereals (all combined) in 63.49 lakh hectares and oilseeds in 7.14 lakh hectares, Jute in 6.09 lakh hectares and potato in 3.67 lakh hectares. The state is second largest producer of Potato after Uttar Pradesh and one of the highest producers of vegetable in the country. Traditionally, West Bengal has been the highest producer of jute. The State also accounts for 25 per cent of tea production in the country, next only to Assam. Against the ultimate irrigation potential of 67.43 lakh hectares, the gross irrigation potential created through major, medium and minor irrigation in the State till the end of March 2009 was 55.01 lakh hectares. The percentage utilization of potential created is 81.73 percent in major and medium irrigation structures and 81.64 percent in minor irrigation.

In case of the intra-sectoral patterns of NSDP, we observe that within the Primary Sector, agriculture has remained dominant all through, though its share has been declining: 27.52% in 1980-81 to 28.37% in 1990-91 to 26.37% in 2000-01

and to 19.54% in 2010-11. The share of forestry has continuously fallen from 1.14% in 1980-81 to 1.11% in 1990-91 and to 0.82% in 2000-01, though with a slight increase in its share of 1.04% in 2010-11. But the reverse trend has happened in case of fishing: 2.96% in 1980-81 to 3.25% in 1990-91 to 3.55% in 2000-01, then registering a marginal decrease in its share to 3.00% in 2010-11.

Table 1.2.1: Percentage Distribution of NSDP by Industry in West Bengal during 1980/81-2010/11

Industry	1980-81	1990-91	2000-01	2010-11
Primary Sector	32.60	33.47	32.30	24.12
Agriculture	*27.52*	*28.37*	*26.37*	*19.54*
Forestry	*1.14*	*1.11*	*0.82*	*1.04*
Fishing	*2.96*	*3.25*	*3.55*	*3.00*
Mining	*0.98*	*0.74*	*1.20*	*0.54*
Secondary Sector	29.28	26.03	18.45	15.60
Tertiary Sector	38.12	40.50	49.25	60.28
Total	100.00	100.00	100.00	100.00

Source: Economic Survey, Various Issues, Govt. of West Bengal

1.3 Importance of Oilseeds in the State Agriculture

In West Bengal, the share of cereals declined over the years, while those of fruits & vegetables increased from their 1980-81 levels. In particular, the share of cereals decreased from 52.76% in 1980-81 to 32.82% in 2005-06, while the share of fruits & vegetables registered a massive increase from 17.74% in 1980-81 to 44.84% in 2005-06. The share of condiments & spices showed marginal increase from 0.92% in 1980-81 to 2.07% in 2005-06, while pulses, sugarcane and fibre showed marginal decline. The share of oilseeds fluctuated over the years, and somehow succeeded to retain its relative importance more or less same over time.

Table 1.3.1: Share of Crop Sector in the Value of Output from Agriculture (%) in West Bengal

Crops	**1980-81**	**1990-91**	**2000-01**	**2005-06**
Cereals	52.76	49.60	31.95	32.82
Pulses	1.93	1.69	0.01	0.01
Oilseeds	2.57	6.00	3.01	2.83
Sugarcane	1.18	0.44	0.53	0.41
Fibres	5.26	5.99	3.60	3.58
Condiments & Spices	0.92	2.08	1.73	2.07
Fruits & Vegetables	17.74	17.64	44.53	44.84

Source: Source: Central Statistical Organization, National Accounts Division

Thus, it is seen that in West Bengal, rapid changes have taken place within the agriculture sectors with growing importance of horticulture products in terms of value of output. Foodgrain crops like cereals and pulses have lost its importance in terms of value added over the years.

1.4 Problems in Oilseeds Production

West Bengal does not occupy any significant position in terms of either acreage or production of oilseeds. In terms of both acreage and production rape and mustard are by far the most important oilseed crops both in terms of area and production. Sesame and linseeds are the other two oilseed crops raised in this state.

A brief review of literature regarding the performance of oilseeds yield and production reveals that a number of factors can be held responsible for the poor performance of the oilseeds sector in the state. These may be put as-

a) Shortage of HYV seeds,

b) Lack of use of irrigation, fertilizer and pesticide in appropriate doses,

c) High risk and uncertainty factors in production

d) Tendency to raise pulses mixed with other crops

e) Poor managerial attention, and

f) Inadequately of extension facilities.

It is very difficult to test some of these factors with filed-level data. In the case of poor managerial input, it is difficult to distinguish between cause and effect – whether it is the effect of poor quality or some inherent characteristics of these crops which make them very little amenable to application of managerial inputs. Some authors have also highlighted technology adoption, improvement in irrigation and adoption of short duration varieties for improving performance of these crops. Often authors argue that pulses are generally not grown in favourable situation and suffer from wild fluctuations in yield because of the adverse situation in which they are grown. Hence it is difficult to isolate the risks associated with crops from the risks inherent in conditions under which pulses are grown. Also, lack of a proper market structure has often been alleged to be creating a variety of problems for the growers of these crops. Some others have emphasized the role of not only technological factors but also social infrastructure including marketing network in improving performance of these crops.

1.5 Objectives of the Study

The specific objectives of the study are:

1. To examine trends and pattern of growth of different edible oilseeds over time in West Bengal and identify the sources of growth in edible oilseeds output in the state; and

2. To identify major constraints in the edible oilseed cultivation and suggest policy options to increase oilseeds production and productivity in the state.

1.6 Organization of the Study

The present study attempts to fulfill its specific objectives as stated earlier and present them in the standard form of a report. In particular, the first chapter of the study introduces us with the broad backdrop of the study and states the specific objectives of the study. The second chapter presents technical aspects like coverage of the study and methodology followed with a brief description of the specific area where the study has been undertaken. In the third chapter of the present study, we present an overview of the oilseeds sector and attempt to analyze its current status and growth behaviour over time, exclusively based on secondary information. In the fourth chapter, we attempt to analyze the problems and prospects of oilseed production through an empirical investigation at the farm household level, and present its results therein. Lastly, the fifth chapter highlights the major findings of the study and draws concluding observations and states their policy implications.

2
Coverage, Sampling Design and Methodology

2.1 Coverage and Sampling Design

The study is based on both primary and secondary data pertaining to edible oilseeds. In order to meet the first two objectives of the study a substantial amount of collection and analysis of secondary data related to area, production and productivity of oilseeds is undertaken. In order to identify major constraints in edible oilseeds production in the country, primary data from households growing oilseeds is collected and analyzed.

A multistage, purposive sampling method is used to select the districts, blocks and farm households based on acreage & yield rate as has been depicted in the following table 2.1.1. At first stage, one district each from high acreage & high yield districts, high acreage & low yield districts, and low acreage & high yield districts have been selected. Since HH, HL and LH districts have potential for increasing production of oilseeds; we have selected at least one district each from these 3 categories for household survey. The 3 selected districts are Nadia, Bankura and North 24 Parganas respectively.

Table 2.1.1
Scheme of Sample District Selection

Area	Yield	
	High	low
High	Nadia District	Bankura District
low	North 24 Parganas	-

At second stage, major oilseeds producing blocks is selected and an appropriate number of villages is selected for household survey. From each selected village an appropriate number of farmers representing different farm categories (Marginal 0-1 ha, Small 1-2 ha, Semi-medium 2-4 ha, and Medium 4-10 ha) based on probability proportional to size in each district, such that we get a minimum of 20 households in each category in the final sample pool. However, we finally club the semi-medium category with medium category, and treat the clubbed category as 'medium' category. In way, a total number of 250 sample households have been selected for the study distributed over different size-categories in selected districts, as shown here in table 2.1.2.

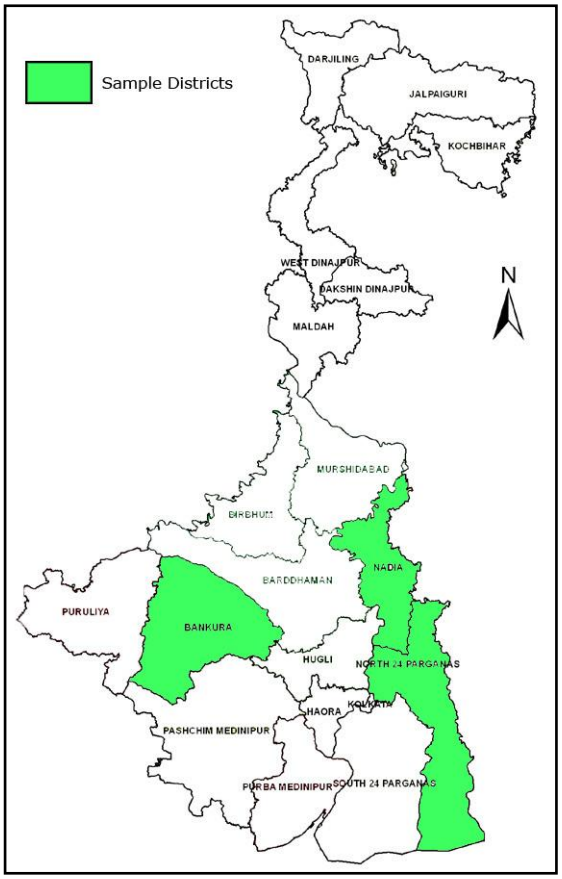
Table 2.1.2
Size-Distribution of Sample Households across Districts

Size-Class	Bankura	Nadia	North 24 Parganas	Total
Marginal	53	56	56	165
Small	17	13	13	43
Semi-medium	7	7	7	21
Medium	7	7	7	21
Total	84	83	83	250

2.2 The Study Area

The present study has been conducted in three purposively selected districts in West Bengal based on acreage and yield rate, as stated earlier in methodology of the study. Here, a brief overview of the selected districts has been presented as follows:

Table 2.2.1: The Study Area



2.2.1 Bankura District

Bankura district is a part of Burdwan Division. It is situated between 22° 38′ and 23° 38′ north latitude and between 86° 36′ and 87° 46′ east longitude. It has an

area of 6,882 square kilometers (2,657 sq mi). On the north and north-east the district is bounded by Bardhaman district, from which it is separated mostly by the Damodar River. On the south-east it is bounded by Hooghly district, on the south by Paschim Medinipur district and on the west by Purulia district. Bankura district has been described as the "connecting link between the plains of Bengal on the east and Chota Nagpur plateau on the west." The areas to the east and north-east are low lying alluvial plains, similar to predominating rice lands of Bengal. To the west the surface gradually rises, giving way to undulating country, interspersed with rocky hillocks. Much of the country is covered with jungles. The climate, especially in the upland tracts to the west, is much drier than in eastern or southern Bengal. From the beginning of March to early June, hot westerly winds prevail, the thermometer in the shade rising to around 45 °C (113 °F). The monsoon months, June to September, are comparatively pleasant. The total average rainfall is 1,400 millimeters (55 in), the bulk of the rain coming in the months of June to September. Winters are pleasant with temperatures dropping down to below 27 °C (81 °F) in December. In 2006 the Ministry of Panchayati Raj named Bankura one of the country's 250 most backward districts (out of a total of 640). It is one of the nineteen districts in West Bengal currently receiving funds from the Backward Regions Grant Fund Programme (BRGF).

Table 2.2.1
Area Profile of Bankura district of West Bengal state

Number of Households	606,020	Average Household Size(per Household)	5.0
Population-Total	3,192,695	Proportion of Urban Population (%)	7.4
Population-Rural	2957447	Sex Ratio	952
Population-Urban	235248	Sex Ratio(0-6 Year)	953
Population(0-6Years)	458,882	Sex Ratio (SC)	968
SC Population	997,408	Sex Ratio (ST)	984
ST Population	330,783	Proportion of SC (%)	31.0
Literates	1,734,222	Proportion of ST (%)	10.0
Illiterates	1,458,473	Literacy Rate (%)	63.0
Total Workers	1,427,272	Work Participation Rate (%)	45.0
Main Worker	944,216	% of Main Workers	30.0
Marginal Worker	483,056	% of Marginal Worker	15.0
Non Worker	1,765,423	% of non Workers	55.0
CL (Main+Marginal)	439,957	Proportion of CL (%)	31.0
Al (Main+Marginal)	503,214	Proportion of AL (%)	35.0
HHI (Main+Marginal)	83,492	Proportion of HHI (%)	6.0
OW (Main+Marginal)	400,609	Proportion of OW (%)	28.0

Source: Website of Office of The Registrar General & Census Commissioner, Govt. of India; 2010-11

2.2.2 Nadia District

Nadia District is located in between 22 º 53' and 24 º 11' North Latitude and 88 º 09' and 88 º 48' East Longitude. The district of Nadia is bounded on the north and north-west by the district of Murshidabad. On the south-east and east it is bounded by the Republic of Bangladesh. In the south and south-east the district is bounded by the district of North 24-Parganas.The shape of the district is irregular, lying North to South. The district is about 46ft. above the mean sea-level and the tropic of cancer divides the district into two parts. Te district has an area of 3927 sq k.m.s having a population of 46,04,827 as per Census 2001. Out of that SC & ST population are 13,65,985 and 1,13891 respectively. The district has 17 Panchayat Samities consist of 187 Gram Panchyats and 8 Municipalities. Total number of Police Stations in the district is 19. The density of population in this district is 1173 persons per sq km. Nadia district has 950 females as against 1000 males. The majority of the people of the district speaks Bengali followed by Hindi, Santali and other. Religion-wise about 73.75% are Hindus and 25.42% are Muslims. In the district of Nadia the percentage of literacy by sex is 72.30 (Male) & 59.60 (Female) as per Census 2001. The important rivers of the district are Bhagirathi, Churni, Mathabhanga, Ichamati and Jalangi. The climate of Nadia district is characterized by an oppressive hot summer; high humidity all the year round and well distributed rainfall during the south west monsoon season. The cold season is from about the end of November to the end of February.

Table 2.2.2
Area Profile of Nadia district of West Bengal state

Number of Households	959,987	Average Household Size(per Household)	5.0
Population-Total	4,604,827	Proportion of Urban Population (%)	21.3
Population-Rural	3625308	Sex Ratio	946
Population-Urban	979519	Sex Ratio(0-6 Year)	972
Population(0-6Years)	606,395	Sex Ratio (SC)	950
SC Population	1,365,985	Sex Ratio (ST)	982
ST Population	113,891	Proportion of SC (%)	30.0
Literates	2,644,461	Proportion of ST (%)	2.0
Illiterates	1,960,366	Literacy Rate (%)	66.0
Total Workers	1,615,705	Work Participation Rate (%)	35.0
Main Worker	1,405,724	% of Main Workers	31.0
Marginal Worker	209,981	% of Marginal Worker	5.0
Non Worker	2,989,122	% of non Workers	65.0
CL (Main+Marginal)	320,464	Proportion of CL (%)	20.0
Al (Main+Marginal)	375,541	Proportion of AL (%)	23.0
HHI (Main+Marginal)	184,411	Proportion of HHI (%)	11.0
OW (Main+Marginal)	735,289	Proportion of OW (%)	46.0

Source: Website of Office of The Registrar General & Census Commissioner, Govt. of India; 2010-11

2.2.3 North 24 Parganas District

North 24 Parganas district is a district in southern West Bengal, of eastern India. North 24 Parganas extends in the [tropical zone] from latitude 22°11'6" north to 23°15'2" north and from longitude 88°20' east to 89°5' east. It is bordered to Nadia by north, to Bangladesh (Khulna Division) by north and east, to South 24 Parganas and Kolkata by south and to Kolkata, Howrah and Hoogly by west. Barasat is the district headquarters of North 24 Parganas. North 24 Parganas is West Bengal's most populous district. It is also the tenth-largest district in the State by area and second-most populated district in the country. The district lies within the Ganges-Brahmaputra delta. The river Ganges flows along the entire west border of the district. There are many other rivers, which include the Ichhamati, Jamuna, and Bidyadhari. The climate is tropical, like the rest of the Gangetic West Bengal. The hallmark is the Monsoon, which lasts from early June to mid September. The weather remains dry during the winter (mid November to mid February) and humid during summer. Muslims are mainly engaged in farming, fishing and other agricultural activities. North 24 Parganas is one of the economically backward Districts of West Bengal, but there is chronic poverty in the southern half of the District (the Sundarbans area).

Table 2.2.3
Area Profile of North Twenty Four Parganas district of West Bengal state

Number of Households	1,826,518	Average Household Size(per Household)	5.0
Population-Total	8,934,286	Proportion of Urban Population (%)	54.3
Population-Rural	4083339	Sex Ratio	926
Population-Urban	4850947	Sex Ratio(0-6 Year)	958
Population(0-6Years)	1,054,338	Sex Ratio (SC)	939
SC Population	1,840,397	Sex Ratio (ST)	960
ST Population	198,936	Proportion of SC (%)	21.0
Literates	6,151,527	Proportion of ST (%)	2.0
Illiterates	2,782,759	Literacy Rate (%)	78.0
Total Workers	2,988,160	Work Participation Rate (%)	33.0
Main Worker	2,623,352	% of Main Workers	29.0
Marginal Worker	364,808	% of Marginal Worker	4.0
Non Worker	5,946,126	% of non Workers	67.0
CL (Main+Marginal)	300,930	Proportion of CL (%)	10.0
Al (Main+Marginal)	406,931	Proportion of AL (%)	14.0
HHI (Main+Marginal)	132,726	Proportion of HHI (%)	4.0
OW (Main+Marginal)	2,147,573	Proportion of OW (%)	72.0

Source: Website of Office of The Registrar General & Census Commissioner, Govt. of India; 2010-11

3
Overview of Oilseeds Sector: Current Status and Growth Behaviour

3.1 Cropping Pattern Changes in the State

After the introduction of the high yielding varieties of seeds and other land augmenting technologies, agriculture in West Bengal has witnessed remarkable changes over time. This has particularly influenced the cropping pattern of the state at large, bringing about increase in acreage of certain crops and decline in particular cases also. It is to be noted here that the impact of Green Revolution spread across West Bengal with a time-lag of one or two decades, as compared to western states like Punjab, Haryana, etc. This is reflected in a rapid in crease in the acreage of certain crops in the 1970s and 1980s. Here, we briefly highlight the salient features of changes in the cropping pattern in West Bengal over the last few decades.

During the last four decades, acreage under foodgrains hardly increased. In particular, it can be observed that it is the acreage of rice only that has shown a fluctuating yet increasing pattern of change. Other foodgrains, like wheat, coarse cereals, pulses, etc. have registered a decline. As such, proportional acreage allocation (as percent to gross cropped area) for rice exhibited a marginal increase, which for wheat, coarse cereals, pulses showed a decline. On the whole, acreage allocation under foodgrains experienced a smooth decline from 96.70 percent in TE 1973-74 to 89.90 percent in TE 2009-10. Yet the fact remains that the state agriculture is still dominated by foodgrains, especially rice.

On the part of the oilseeds, it is quite inspiring to observe that area under oilseeds (especially mustard) registered a sharp increase over time. In particular, while proportional allocation of land under rapeseed and mustard increased from 1.70 percent during TE 1973-74 to 5.80 percent during TE 2009-10, that for other oilseeds (including sesame) increased from 1.10 percent to 4.00 percent over the same period of time. As a result of these changes, proportional acreage allocation (as percent of gross cropped area) under oilseeds registered a sharp increase from 1.10 percent in TE 1973-74 to 9.80 percent in TE 2009-10. As such, it comes out that over the last few decades, while cultivation of foodgrains lost its importance to some extent, cultivation of oilseeds has gained significance in the cropping pattern in West Bengal agriculture. It should however be noted here that during the post-reforms period (after 1990s), area under rapeseed and mustard has increased only marginally, while area under other oilseeds like sesame has registered a steep increase. This in turn indicates that the recent growth in the oilseeds sector in West Bengal can largely be attributed to oilseeds like sesame (and sunflower) as compared to traditional oilseeds like rapeseeds and mustard.

Other crops like cotton and sugarcane remain to be marginal contributors to gross cropped area under the state. In fact, cultivation of cotton has never been significant in West Bengal, and the situation has been so till date and that only about 0.10 percent of gross cropped area falls under cotton cultivation. On the other hand, cultivation of sugarcane has recorded a sharp decline over the years, which is argued by many authors as a result of closure of sugar mills across the state in the post-reform period. On the whole, it comes out that while cultivation of foodgrains has been losing its importance in the state to some extent, cultivation of oilseeds, especially sesame, is getting importance over time.

Table 3.1.1: Total cropped area under selected crops in the State: TE1973-74 to TE 2009-10

Crops	***Area (million ha)***				
	TE 1973-74	***TE 1983-84***	***TE 1993-94***	***TE 2003-04***	***TE 2009-10***
Rice	5091.90	5148.00	5761.10	5922.60	5761.80
Wheat	373.60	269.80	275.70	421.70	325.10
Total coarse cereals	133.40	108.40	80.70	60.80	107.30
Total cereals	5598.90	5526.30	6117.50	6405.10	6194.20
Total pulses	600.80	414.90	271.60	247.60	189.10
Total foodgrains	6199.70	5941.20	6389.40	6652.70	6383.30
Groundnut	-	-	-	-	-
Rapeseed and Mustard	108.40	154.50	395.50	433.30	410.10
Soybean	-	-	-	-	-
Sunflower	-	-	-	-	-
Other oilseeds	68.10	182.90	147.30	185.90	287.60
Total oilseeds	176.50	337.40	542.80	619.20	697.60
Cotton	0.00	0.20	0.10	1.30	4.10
Sugarcane	32.40	24.90	14.20	19.90	16.00
Total cropped area	6408.50	6303.70	6946.60	7293.10	7101.00
Crops	***Percent to Total/Gross Cropped Area***				
	TE 1973-74	***TE 1983-84***	***TE 1993-94***	***TE 2003-04***	***TE 2009-10***
Rice	79.50	81.70	82.90	81.20	81.10
Wheat	5.80	4.30	4.00	5.80	4.60
Total coarse cereals	2.10	1.70	1.20	0.80	1.50
Total cereals	87.40	87.70	88.10	87.80	87.20
Total pulses	9.40	6.60	3.90	3.40	2.70
Total foodgrains	96.70	94.20	92.00	91.20	89.90
Groundnut	-	-	-	-	-
Rapeseed and Mustard	1.70	2.50	5.70	5.90	5.80
Soybean	-	-	-	-	-
Sunflower	-	-	-	-	-
Other oilseeds	1.10	2.90	2.10	2.50	4.00
Total oilseeds	2.80	5.40	7.80	8.50	9.80
Cotton	0.00	0.00	0.00	0.00	0.10
Sugarcane	0.50	0.40	0.20	0.30	0.20

Source: Statistical Abstract (Govt. of West Bengal)-Various Issue.

Though there are significant changes in the cropping pattern over time, we must add here that the changes that occurred during the period TE 1973-74 to TE 2009-10 is largely due to crop intensification effects, and not due to intensification of net sown area. In fact, there has been very little positive change in net sown area of the state; rather net sown area registered a decline over the years. This happened even though gross cropped area exhibited an increasing trend. As is comes out from our analysis, the only exception to this has been the period TE 1983-84 to TE 1993-94, in which net sown area also increase, though marginally. As such, the changes in the cropping pattern that took place during the period TE 1973-74 to TE 2009-10 is largely the effect of crop intensification occurred in the state agriculture, and not a result of area expansion.

Table 3.1.2: Changes in Gross Cropped Area: Area expansion and crop intensification effects: TE 1973-74 to TE 2009-10

Indicators	TE 1973-74 to 1983-84	TE 1983-84 to 1993-94	TE 1993-94 to 2003-04	TE 2003-04 to 2009-10	TE 1973-74 to 2009-10
Change in GCA	3.13 (0.04%)	1548.36 (21.87%)	1021.19 (11.83%)	44.24 (0.46%)	2616.93 (36.98%)
Change in GIA	-	-	-	-	-
Area Expansion					
Net Sown Area (NSA)	-63.25 (-1.15%)	41.94 (0.77%)	-42.34 (-0.77%)	-152.61 (-2.81%)	-216.26 (-3.93%)
Net irrigated area (NIA)	-	-	-	-	-
Crop intensification					
GCA - NSA	-60.12 (-1.11%)	1506.41 (21.10%)	978.85 (11.06%)	-108.37 (-2.35%)	2400.67 (33.05%)
GIA - NIA	-	-	-	-	-

Source: Statistical Abstract (Govt. of West Bengal)-Various Issue.

3.2 Factors Underlying Changes in Cropping Pattern

From our earlier analysis, it comes out that cropping pattern in the state has changed away from foodgrains to oilseeds crops over the period from TE 1973-74 to TE 2009-10. Also, some commercial crops and fruits, vegetables and flowers also exhibited tremendous growth during this period, especially after the 1990s. Naturally, it is worth mentioning at least some of the important factors that brought about the said changes in the cropping pattern of the state. Here, an attempt has been made to discuss these factors in brief.

First, West Bengal has been a late adopter of the seed-fertilizer package introduced in the Green Revolution period in the late 1960s. The spread of HYV cultivation practices in the foodgrains sector actually took up momentum since the 1970s, and especially in the 1980s. As such, rampant growth is observed in the foodgrains sector during the 1980s. However, this magnificent growth trajectory soon came to a halt in the early 1990s, as expansion of area under foodgrains (especially summer rice) ceased to grow further. Hence, the entire period from TE 1973-74 to TE 1993-94 can be viewed as a period of growth in foodgrains sector, especially summer rice. With this and with the partial increase in the availability of irrigation, cultivation of oilseeds (especially mustard) and few other crops (like potato) gained momentum. This is particularly because of the fact that mustard and potato is grown in rabi season, that complements (and not contradicts) cultivation of paddy in kharif and summer season.

Second, though net irrigated area increased partially during the 1970s and 1980s to support the growth of expansion of HYV cultivation in the foodgrains sector, gross irrigated area almost came to a halt in the post reforms period, especially since the 1990s. In fact, there have been hardly any large or medium irrigation schemes that supported further growth in net irrigated area since the late 1980s. As such, West Bengal agriculture had to find out alternatives to keep the momentum growing in the expansion of gross cropped area. It is here that during this period, viz. after the 1990s, cultivation of crops like sesame among oilseeds gained momentum, particular as it demands less assured irrigation availability. Thus, while further expansion of summer paddy came to a halt, area under sesame continued to grow since the 1990s to reap out the situational benefit of stagnation in the growth of net irrigated area.

Lastly, some other cops like potato, fruits and vegetables, flowers, spices, etc. exhibited a rampant growth since the mid-1990s. In fact, there has been a large debate among various authors as to whether this change in cropping pattern has been due to the opening up of the economy after the 1990s or not. Nevertheless, the fact remains that these crops exhibited spectacular growth in area and production over the last few years. This no doubt complements a stagnating (or even decelerating) growth of the foodgrains sector and a comparatively slower growth in the oilseeds sector in the state agriculture.

Hence, it comes out that the changes in cropping pattern over the last few decades in the state resulted from situational advantage or disadvantage for specific crops to grow in acreage and yield rate. This was actively backed by several government schemes to promote specific crops like HYV rice or newer breeds of oilseeds over definite time periods. Though with a sufficient time-lag, the results are clearly reflected in the changes that took place in the cropping pattern of the state.

3.3 Growth Trends in Area, Production and Yield of Major Oilseeds

Among the major changes that took place in the cropping pattern of West Bengal agriculture, growth of oilseeds sector is no doubt a significant change. Data on area, production and yield rate of oilseeds in the state clearly reflects the growth trajectory of oilseeds sector over the last five decades, thanks to various government schemes and favourable condition for the growth of the sector. In fact, area, production and yield rate of oilseeds exhibited a continuous growth over the last five decades, viz. since the 1960s. There has been a quantum jump especially in the area and production of oilseeds during the 1970s. During this decade area under oilseeds more than doubled itself, while production grew by nearly four times. This has been especially due to a rapid increase in area under rapeseed and mustard in the state.

Table 3.3.1: Trends in Average Area, Production, and Yield of Oilseeds in the State

	1951-52 to 1960-61	1961-62 to 1970-71	1971-72 to 1980-81	1981-82 to 1990-91	1991-92 to 2000-01	2001-02 to 2009-10
Area ('000 hectares)	-	161.80	208.09	433.11	525.30	659.32
Production ('000 tonnes)	-	59.40	84.89	306.80	426.23	605.00
Yield (kg/ha)	-	367.50	402.99	683.44	809.32	915.32

Source: Statistical Abstract (Govt. of West Bengal)-Various Issue.

In the later decades, viz., during the 1980s, oilseeds sector grew further, but at a slower rate as compared to the earlier decade. Since the 1990s, however, the growth in the oilseeds sector can largely be attributed to oilseeds like sesame, sunflower, groundnut, etc. But the fact remains that oilseeds sector in West Bengal have witnessed a consistent growth in area, production as well as yield rate throughout the last fifty years. This is especially impressive considering a corresponding slowdown in the foodgrains sector in the state, especially since the 1990s.

Considering the period from TE 1993-94 to TE 2009-10, a district-wise analysis of available secondary data reveals that area under foodgrains registered a decline in 9 districts out of 16 districts considered, as well as for the state as a whole. In relative terms, area under foodgrains declined by 0.10 percent over the period TE 1993-94 to TE 2009-10. As compared to foodgrains, there has been a significant increase in area under oilseeds over the same period of time, accounting for about 28.58 percent in relative terms. In particular, except for three districts, all other districts in the state recorded an increase in area under oilseeds cultivation.

However, as has been mentioned earlier, there has been a compositional shift in the oilseeds sector itself. While area under rapeseed and mustard grew only by 3.70 percent in relative terms over the period TE 1993-94 to TE 2009-10, area under sesame increased sharply by about 80 percent over the same period of time.

Table 3.3.2: Net changes in absolute and relative terms for major foodgrains crops in the State: TE 1993-94 and TE 2009-10
(Absolute change (A) in '000 ha; Relative change (R) in percentage)

District	Rice		Wheat		Maize		Other Coarse Cereals		Total Cereals		Total Pulses		Total Food Grain	
	A	R	A	R	A	R	A	R	A	R	A	R	A	R
Burdwan	88.40	15.50	-0.70	-27.64	0.40	0.00	0.0	0.0	87.90	15.36	0.50	31.55	88.40	15.40
Birbhum	34.50	9.93	22.60	205.87	-0.40	-46.10	-0.60	-78.00	56.00	15.55	7.40	79.53	63.40	17.16
Bankura	-27.30	-6.56	-4.80	-55.27	-1.80	-86.00	-0.40	-60.80	-34.20	-8.02	-3.00	-91.69	-37.20	-8.65
Midnapore	44.10	4.19	-1.30	-18.26	0.20	0.20	26.80	-0.10	-100.00	42.90	4.05	-4.90	-24.55	38.00
Howrah	-20.10	-14.78	0.01	7.17	0.10	0.00	0.00	0.00	-20.00	-14.68	-1.00	-58.71	-20.90	-15.20
Hooghly	29.80	10.92	-0.80	-49.59	0.20	0.00	0.00	0.00	29.30	10.67	0.04	7.40	29.30	10.67
N.24 Paraganas	-33.40	-11.33	-0.50	-6.34	0.10	0.00	0.00	0.00	-33.80	-11.16	-2.80	-22.94	-36.60	-11.63
S.24 Parganas	-30.40	-7.10	1.60	0.00	0.3	0.0	0	0.0	-28.5	-6.66	3.8	37.20	-24.7	-5.64
Nadia	-24.60	-8.88	-2.70	-6.27	1.50	105.50	-0.90	-75.20	-26.60	-8.25	-23.60	-39.46	-50.20	-13.14
Murshidabad	38.30	10.87	19.60	22.10	3.30	469.20	-0.90	-31.10	60.30	13.56	-1.30	-2.97	59.00	12.09
West Dinajpur	4.10	0.88	15.80	54.61	21.00	6301.20	4.00	704.60	44.90	9.03	-16.70	-77.35	28.20	5.44
Malda	-47.40	-19.52	3.40	8.09	3.00	45.20	-5.00	-80.60	-45.90	-15.45	-31.70	-59.19	-77.70	-22.14
Jalpaigri	-26.80	-10.33	2.30	16.46	9.30	383.50	-0.10	-13.10	-15.30	-5.52	1.30	43.22	-14.00	-5.00
Darjeeling	-13.30	-29.18	-1.20	-35.78	-7.40	-32.20	0.00	0.30	-21.90	-26.14	-0.90	-44.80	-22.80	-26.58
Cooch Behar	-19.20	-6.15	-3.50	-22.76	9.70	0.00	-0.70	-49.20	-13.80	-4.19	-3.90	-38.69	-17.70	-5.23
Purulia	2.00	0.70	-0.40	-21.12	-5.30	-41.30	-1.50	-80.80	-5.10	-1.67	-5.70	-29.35	-10.80	-3.29
State	0.70	0.01	49.50	17.94	37.30	72.70	-10.80	-36.70	76.70	1.25	-82.5	-30.38	-6.10	-0.10

Source: Statistical Abstract (Govt. of West Bengal)-Various Issue.

Continued….

Table 3.3.2 (continued….)

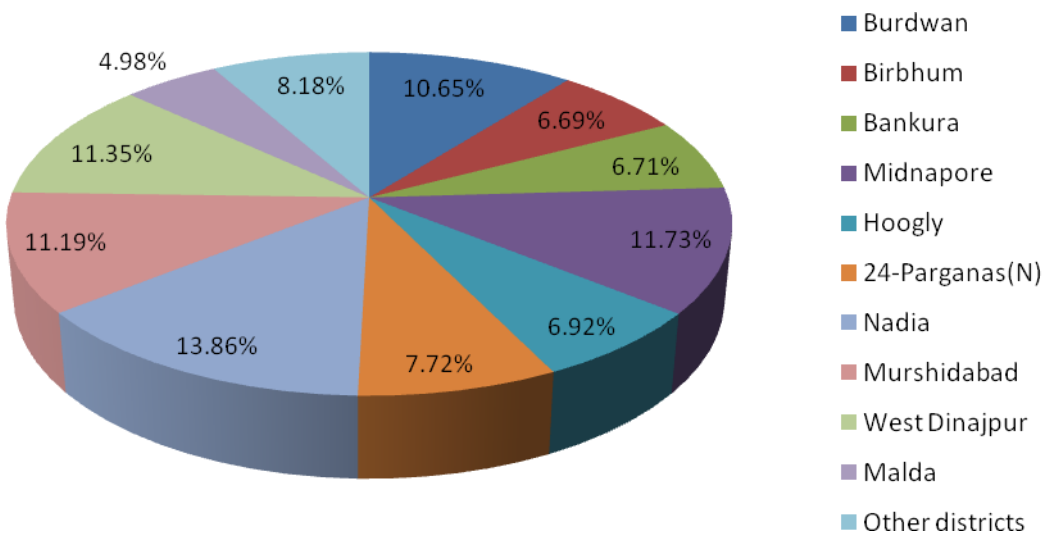
Net changes in absolute and relative terms for major commercial crops in the State: TE1993-94 and TE2009-10
(Absolute change (A) in '000 ha; Relative change (R) in %age)

District	Groundnut		R&M		Sesame		Soybean		Total oilseeds		Cotton		S Cane		F&V		GCA	
	A	R	A	R	A	R	A	R	A	R	A	R	A	R	A	R	A	R
Burdwan	-	-	-22.00	-45.75	11.60	128.83	-	-	-8.90	-15.36	-	-	-0.10	-7.19	-	-	173.50	25.54
Birbhum	-	-	-1.00	-2.84	2.50	146.96	-	-	1.70	4.70	-	-	-0.20	-15.91	-	-	136.70	32.86
Bankura	-	-	-6.30	-32.30	9.70	59.53	-	-	4.00	10.89	-	-	-0.10	-88.80	-	-	45.90	9.46
Midnapore	-	-	-9.40	-33.93	39.20	150.30	-	-	57.00	89.62	-	-	0.70	48.98	-	-	266.60	21.87
Howrah	-	-	-0.80	-47.24	-2.20	-55.66	-	-	1.50	25.29	-	-	-	-	-	-	10.40	6.96
Hooghly	-	-	-0.60	-5.58	3.20	13.01	-	-	12.50	33.31	-	-	0.20	197.67	-	-	135.80	33.18
N.24 Parganas	-	-	2.90	8.31	2.60	40.73	-	-	8.00	18.99	-	-	-0.30	-39.10	-	-	98.90	24.60
S.24 Parganas	-	-	-0.60	-17.15	0.70	48.66	-	-	8.30	163.53	0.80	830.67	-	-	-	-	71.70	15.58
Nadia	-	-	7.30	11.97	11.40	118.45	-	-	21.10	28.09	-	-	-0.30	-14.49	-	-	99.40	16.89
Murshidabad	-	-	25.60	45.30	11.80	297.49	-	-	37.50	61.80	-	-	2.20	56.68	-	-	289.00	43.80
West Dinajpur	-	-	4.10	7.30	-0.60	-38.52	-	-	2.40	3.84	-	-	-	-	-	-	153.60	23.17
Malda	-	-	8.90	35.52	-0.40	-73.33	-	-	7.70	28.51	-	-	-0.40	-15.51	-	-	15.80	3.84
Jalpaigri	-	-	2.10	26.73	0.40	34.19	-	-	4.60	41.75	-	-	-	-	-	-	124.30	28.93
Darjeeling	-	-	-0.50	-70.64	-0.20	-59.33	-	-	-0.80	-60.33	-	-	-	-	-	-	75.40	63.30
Cooch Behar	-	-	5.30	83.39	-1.20	-71.55	-	-	3.50	27.97	-	-	-	-	-	-	97.00	21.90
Purulia	-	-	-0.40	-22.57	-0.90	-60.04	-	-	-4.90	-56.26	-	-	-0.10	-15.00	-	-	25.40	7.48
State	-	-	14.60	3.70	87.50	79.74	-	-	155.10	28.58	4.00	3989.67	1.80	12.90	-	-	1820.10	23.11

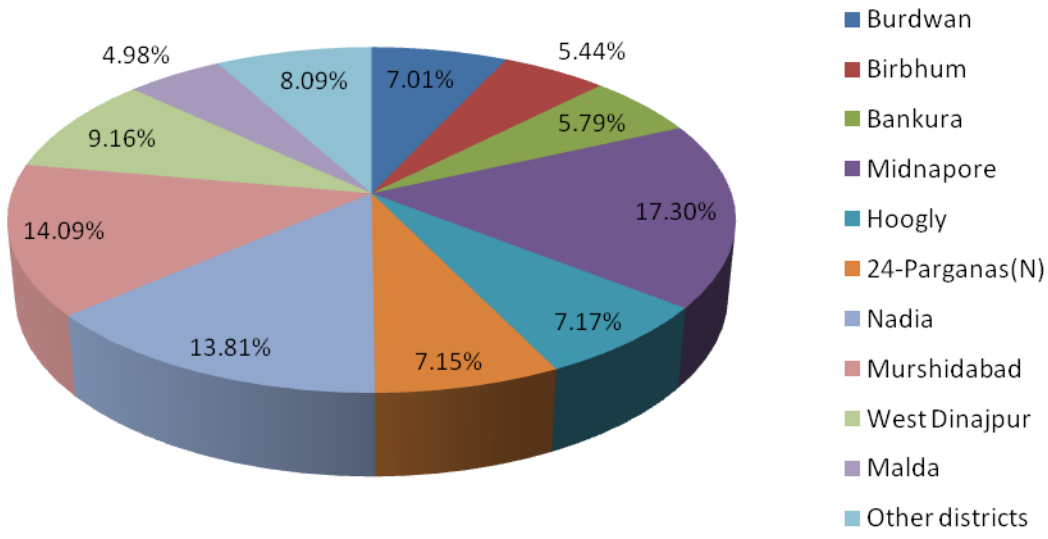
Source: Statistical Abstract (Govt. of West Bengal)-Various Issue.
Note1: Latest GCA is related to TE 2000-1

Table 3.3.3: Changing Shares of Major Districts in Area under Oilseeds in the State: TE1993-94 and TE2009-10

TE 1993-94



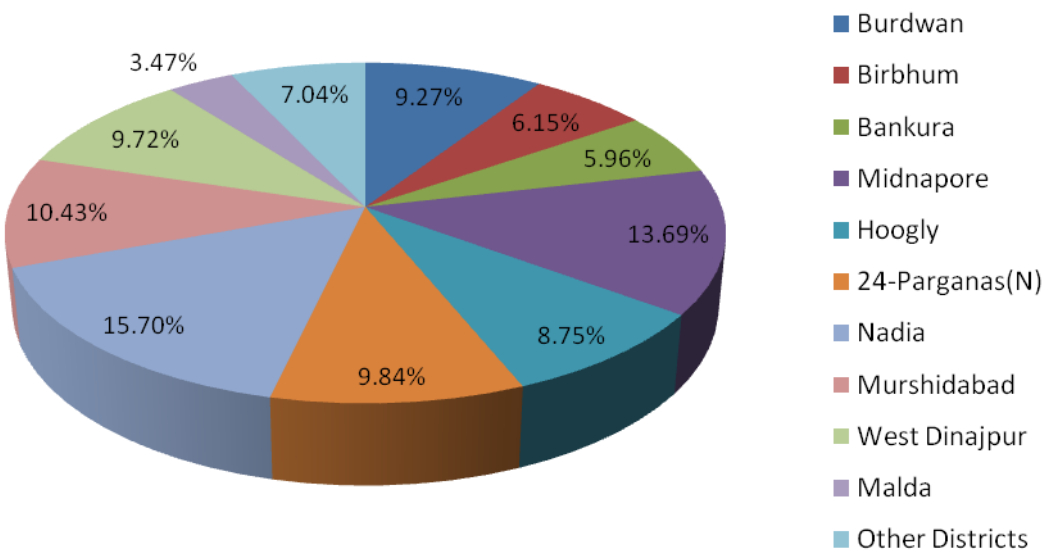
TE 2009-10



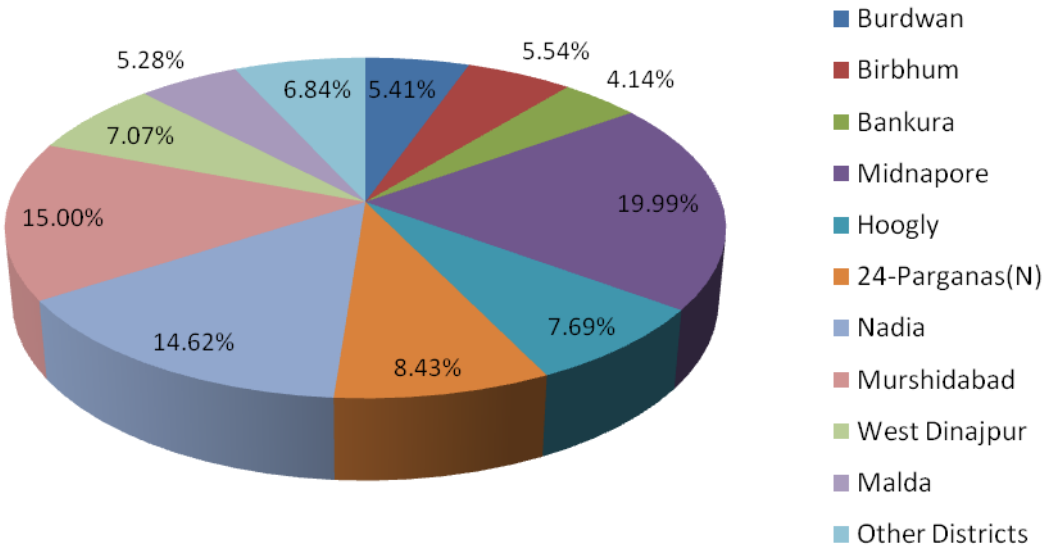
Source: Statistical Abstract (Govt. of West Bengal)-Various Issue.

Table 3.3.4: Share of Major Districts under Oilseeds Production in the State: TE1993-94 and TE2009-10

TE 1993-94



TE 2009-10



Source: Statistical Abstract (Govt. of West Bengal)-Various Issue.

District-wise decomposition further shows here that while area under rapeseed and mustard registered an increase in 7 out of 16 districts concerned, area under sesame grew in 10 out of the same 16 districts concerned. The relative increase has been the maximum for Murshidabad district, while in absolute terms, the growth has been more pronounced in Midnapore District. It is also to be noted here that in 7 out of 16 districts, area under sesame increased even there has been a decline in the area under mustard. Hence, cultivation of oilseeds no doubt has witness a compositional shift from mustard to sesame over the period TE 1993-94 to TE 2009-10.More detailed investigation into the pattern of changes in area under oilseeds for the major producing districts reveals that the share of major districts in terms of area under oilseeds cultivation remains more or less unchanged. This means that the growth of area under oilseeds has been more or less uniform across the districts over the period TE 1993-94 to TE 2009-10. Even then, it is to be noted that the share of Midnapur and Murshidabad district registered sharp increase in their relative share in area under oilseeds, while that for Burdwan district registered the largest decline. Other districts showing decline in relative share in area under oilseeds include districts like West Dinajpur, Bankura and Birbhum, while relative share in area under oilseeds increased for districts like Hooghly. The relative share in area under oilseeds remained unchanged for Malda district. Similarly, in case of relative share in production of oilseeds, the respective relative shares of districts like Burdwan, Birbhum, Bankura, North 24 Parganas, Nadia and West Dinajpur registered a decline, while that for districts like Murshidabad, Midnapur and Malda registered sharp increase.

It thus comes out that though the increase in area and production of oilseeds in the state in more or less uniform across the districts, some districts like Murshidabad and Midnapore have performed much better than other districts where both area and production grew at a more pronounced manner than other districts.

Table 3.3.5: Share of Selected Oilseeds: TE 2009-10

Oilseeds	Area (per cent)	Production (per cent)		Oil content of seeds (per cent)
		Oilseeds	Oil	
Groundnut	-	-	-	-
Soybean	-	-	-	-
Rapeseed-mustard	58.78	55.58	58.89	41.00
Sesame	28.28	23.44	21.20	35.00
Sunflower	-	-	-	-
Safflower	-	-	-	-
Niger	-	-	-	-
Castor seed	-	-	-	-
Linseed	0.73	0.20	0.22	40.00
Total oilseeds	100.00	100.00	100.00	38.70
Kharif	-	-	-	-
Rabi	-	-	-	-

Source: Statistical Abstract (Govt. of West Bengal)-Various Issue.

We must add here that though spread of sesame cultivation has been the engine of growth in the oilseeds sector in West Bengal in the recent past, cultivation of rapeseed and mustard still remains the dominant oilseeds in the state. In particular, the share of rapeseed and mustard in area under oilseeds accounts for about 58.78 percent, and their share in oilseeds and oil remain to be 55.58 percent and 58.89 percent respectively. In contrast, the respective share in area, oilseeds and oil for sesame comes out to be 28.28 percent, 23.44 percent and 21.20 percent respectively. Other oilseeds like linseed contribute less than 1 percent to area and production of oilseeds. Note that production of oilseeds and oil from sesame is relatively lower as compared to rapeseed and mustard, which arises from the fact that oil content in sesame (35 percent) is lower than that of mustard (41 percent). As such, though sesame commands over 28.28 of oilseed area, it accounts for about 23.44 percent of oilseed production.

Again, it comes out that share of major districts in oilseed acreage in the state has shown a decline over the period from TE 1993-94 to TE 2009-10, which holds true for all the oilseeds concerned, viz. mustard, sesame and linseed. This in turn indicates that the growth observed earlier in the oilseeds sector, especially in sesame, has its origin not from the traditionally major oilseed producing districts, but from other districts of the state.

Further, during the period from TE 1993-94 to TE 2009-10, it can be observed that relative share of oilseeds acreage in all-India area under oilseeds has shown an increase from 2.11 percent in TE 1993-94 to 2.60 percent in TE 2009-10. While the relative share of mustard has remained largely unchanged, that for sesame increased from 0.43 percent of all-India total to 0.74 percent. Though a negligible share as ratio to all-India acreage of sesame, it is true that it is sesame that grew in acreage allocation in the state over the concerned period of time, viz. TE 1993-94 to TE 2009-10.

Table 3.3.6: Share of Major Districts in Oilseeds Acreage in the State: TE 1993-94 and TE 2009-10

Oilseeds	**Major Districts**	
	TE 1993-94	*TE 2009-10*
Groundnut	-	-
Rapeseed-mustard	24.70 (1.54%)	21.98 (1.53%)
Sesame	9.05 (0.43%)	6.34 (0.74%)
Soybean	-	-
Sunflower	-	-
Safflower	-	-
Niger	-	-
Castor seed	-	-
Linseed	3.55 (0.04%)	0.78 (0.02%)
Total Oilseeds	100.00 (2.11%)	100.00 (2.60%)

Source: Statistical Abstract (Govt. of West Bengal)-Various Issue.
Figures in parentheses show the state's per cent share in all-India area

A similar observation can be made here for share of major districts in production of oilseeds as well as for the share of production of the state to all-India production of oilseeds. In particular, while share of major districts in the production of mustard, sesame and linseed declined over TE 1993-94 to TE 2009-10, share of state's sesame production to all-India production of sesame registered an increase. All these in turn indicate that cultivation of sesame has spread across the state, particularly in districts which are not considered as major oilseed producing districts of the state.

Table 3.3.7: Share of Major Districts in Oilseeds Production in the State: TE 1993-94 and TE 2009-10

Oilseeds	Major Districts	
	TE 1993-94	*TE 2009-10*
Groundnut	-	-
Rapeseed-mustard	26.56 (1.48%)	23.59 (1.36%)
Sesame	3.37 (0.49%)	2.23 (0.57%)
Soybean	-	-
Sunflower	-	-
Safflower	-	-
Niger	-	-
Castor seed	-	-
Linseed	1.49 (0.01%)	0.31 (0.00%)
Total Oilseeds	100.00 (2.12%)	100.00 (2.45%)

Source: Statistical Abstract (Govt. of West Bengal)-Various Issue.
Figures in parentheses show the state's per cent share in all-India area

3.4 Variability in Area, Production and Yield of Sesame

Though in West Bengal mustard has been the major oilseed thought the last few decades, but very recently (especially since the 1990s) there has been a slowdown in the growth of mustard while sesame is fast coming up as a major oilseed in the state. In fact, growth in area, production and yield rate of sesame has been quite impressive throughout the decades. Over the last four decades, area under sesame grew by more than four times from 40.46 thousand hectares during the 1970s to 162.46 thousand hectares during the last decade 2000s. Production of sesame on the other hand grew even sharper from 21.82 thousand tonnes in 1970s to as high as 138.02 thousand tonnes during 2000s, thanks to increasing trend in the yield rate from 554 kg/ha to 851 kg/ha over the same period of time. All these in turn have placed sesame as a major oilseed crop in the state commanding over 28 percent area under oilseeds. From our earlier analysis, it is also observed that along with the major oilseed producing districts, sesame (or sesame) has grown in areas which are not traditionally known as oilseed producing districts, and has come up as a situational solution to farming in summer under non-

availability or poor availability of irrigation conditions. In particular, instead of being a competitive crop to summer paddy, sesame can also be considered as a complementary crop to summer paddy, as sesame is grown in summer in such plots where summer paddy is not grown and would have been left fallow otherwise.

Table 3.4.1: Average Area, Production, and Yield of Sesame in the State: 1951-52 to 2009-10

	1951-52 to 1960-61	1961-62 to 1970-71	1971-72 to 1980-81	1981-82 to 1990-91	1991-92 to 2000-01	2001-02 to 2009-10
Area(000 hectare)	-	-	40.46	98.48	112.65	162.46
Production ('000 tonnes)	-	-	21.82	66.75	90.67	138.02
Yield (kg/ha)	-	-	554.00	666.00	812.00	851.00

Source: Statistical Abstract (Govt. of West Bengal)-Various Issue.

Here, a district-wise analysis of area under sesame cultivation brings out some important observations. First, during the period TE 1983-84 to TE 2009-10, shares in acreage of sesame for districts like North & South 24 Parganas, Murshidabad and especially Nadia and Midnapore East & West have recorded an increase, while shares of districts like Burdwan, Birbhum, Bankura, Howrah and Hooghly have declined. It is to be noted here that during TE 1983-84, the Burdwan claimed to have the major share in acreage of sesame (19.75 percent), followed by Hooghly, Bankura and Midnapore (East and West). At present however, Midnapore (East and West) claims to have the largest share in acreage of sesame in the state (33.11 percent), followed by Hooghly, Bankura, Nadia and Burdwan. Clearly, there has been a change in the share of districts in acreage of sesame over time. Similar shifts in relative importance of the districts in terms of acreage of edible oilseeds, where districts like Burdwan and Uttar & Dakshin Dinajpur lost their importance, while districts like Midnapore (East & West), Murshidabad and Nadia has emerged as important districts.

In case of changes in the share of major districts in the production of sesame over the period TE 1983-84 to TE 2009-10, similar observations can be made. In particular, while districts like Burdwan and Hooghly have lost their relative importance in the state in terms of production of sesame, districts like Midnapore (East & West), 24 Parganas (North & South) and Nadia has emerged as major contributors to state's sesame production. If we consider changes in area and production of sesame for the major district over the period TE 1993-94 to TE 2009-10, it clearly comes out that districts like Midnapore (East and West) and Hooghly gained in relative terms of acreage of sesame in the state. In particular, the share of Midnapore E & W) increased from 23.78 percent during TE 1993-94 to 33.11 percent during TE 2009-10. Similarly, in case of changes in relative share in the production of sesame for the major districts over TE 1993-94 to TE 2009-10,

it can be observed that shares of districts like Midnapore (East & West), Nadia and Murshidabad have increased sharply. In particular, relative share of Midnapore (E & W) in sesame production increased from 26.12 percent to 30.08 percent over the concerned time period. On the other hand, relative share in production of sesame for districts like Hooghly registered a sharp decline. Numerically, relative share of Hooghly in TE 1993-94 stood at 25.31 percent, which drastically dropped to 14.82 percent during TE 2009-10.

As such, it may be safely said that there has been much variability in the area and production of sesame (considered as a major oilseed) in West Bengal over the decades.

Table 3.4.2: Share of Major Districts in Area under Sesame in the State: TE1983-84 and TE2009-10

District	Share in State acreage				Share in edible oilseed acreage in the district			
	TE 1983-84	TE 1993-94	TE 2003-04	TE 2009-10	TE 1983-84	TE 1993-94	TE 2003-04	TE 2009-10
Burdwan	19.75	8.17	5.62	10.40	13.12	10.65	8.95	7.01
Birbhum	7.93	1.55	1.23	2.13	8.10	6.69	6.19	5.45
Bankura	14.41	14.91	16.27	13.23	6.06	6.71	5.31	5.79
Midnapore(E & W)	12.96	23.78	33.93	33.11	5.84	11.73	13.42	17.29
Howrah	2.95	3.61	1.25	0.89	1.31	1.06	0.69	1.04
Hoogly	17.97	22.66	12.85	14.24	7.26	6.92	5.24	7.17
24-Parganas(N & S)	3.77	6.96	4.23	5.50	5.96	8.66	8.07	9.06
Nadia	3.98	8.75	11.83	10.63	11.32	13.86	17.39	13.81
Murshidabad	6.96	3.61	5.98	7.99	12.49	11.19	12.33	14.08
U. & D. Dinajpur	6.87	1.46	4.49	0.50	16.61	11.35	10.83	9.17
Malda	0.33	0.46	0.13	0.07	4.35	4.98	5.89	4.98
Jalpaiguri	0.75	0.94	0.97	0.70	2.93	2.04	1.91	2.25
Darjeeling	0.33	0.27	0.21	0.06	0.37	0.26	0.08	0.08
Cooch Behar	0.57	1.49	0.29	0.24	3.51	2.29	3.16	2.27
Purulia	0.45	1.37	0.73	0.30	0.76	1.61	0.55	0.55
West Bengal	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Source: Statistical Abstract (Govt. of West Bengal)-Various Issue.

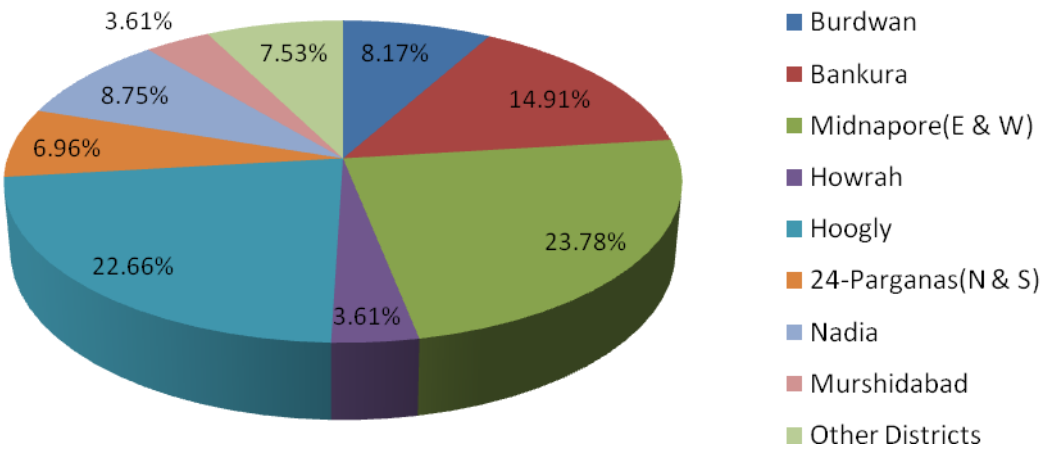
Table 3.4.3: Share of Major Districts in Sesame Production in the State: TE1983-84 and TE2009-10

District	Share in State acreage				Share in edible oilseed acreage in the district			
	TE 1983-84	TE 1993-94	TE 2003-04	TE 2009-10	TE 1983-84	TE 1993-94	TE 2003-04	TE 2009-10
Burdwan	23.82	5.98	5.36	8.37	19.15	9.27	8.82	5.88
Birbhum	4.71	0.95	1.21	1.84	6.75	6.15	7.31	5.50
Bankura	12.44	12.50	13.05	10.22	5.89	5.96	4.46	4.12
Midnapore(E & W)	14.57	26.12	36.50	30.08	6.33	13.69	16.11	19.87
Howrah	3.03	3.60	1.43	1.10	1.48	1.10	0.78	1.45
Hoogly	18.50	25.31	12.74	14.82	8.34	8.75	5.49	7.65
24-Parganas(N & S)	3.98	8.53	5.08	7.87	5.56	10.95	8.03	10.62
Nadia	4.43	9.65	14.29	14.35	10.68	15.70	17.88	14.54
Murshidabad	7.57	2.38	6.66	9.92	12.11	10.43	13.01	14.91
U. & D. Dinajpur	4.93	1.49	2.32	0.32	12.22	9.72	8.40	7.04
Malda	0.17	0.27	0.06	0.06	5.95	3.47	6.15	5.25
Jalpaiguri	0.73	0.99	0.77	0.64	2.20	1.80	1.27	1.66
Darjeeling	0.39	0.20	0.09	0.04	0.46	0.18	0.05	0.03
Cooch Behar	0.45	1.26	0.19	0.19	2.27	1.71	1.86	1.09
Purulia	0.28	0.78	0.40	0.17	0.60	1.13	0.38	0.34
West Bengal	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

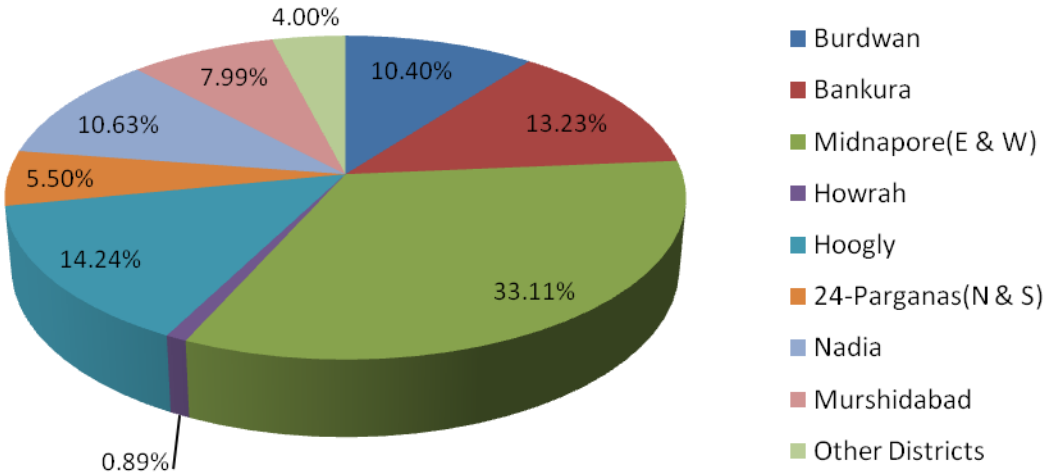
Source: Statistical Abstract (Govt. of West Bengal)-Various Issue.

Table 3.4.4: Shares of Major Districts in Area of Sesame in the State: TE 1993-94 and TE 2009-10

TE 1993-94



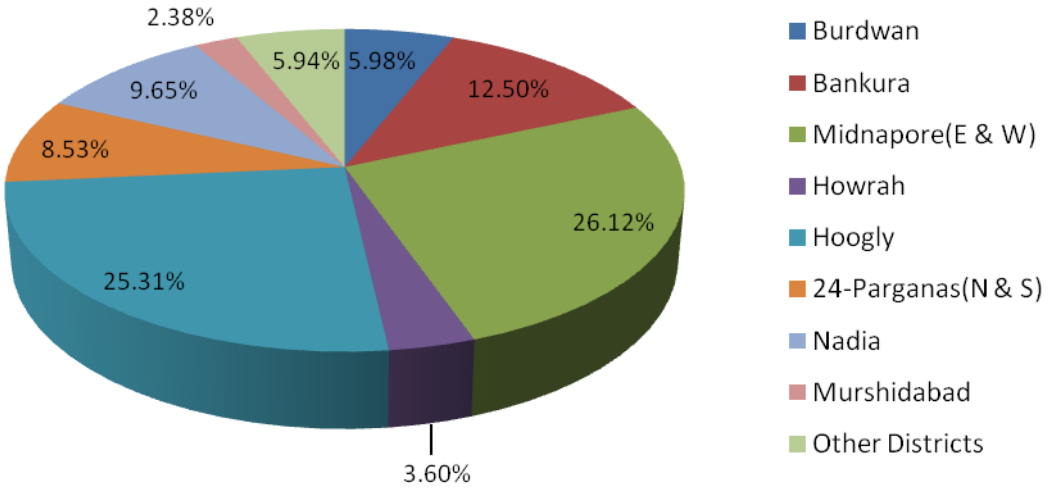
TE 2009-10



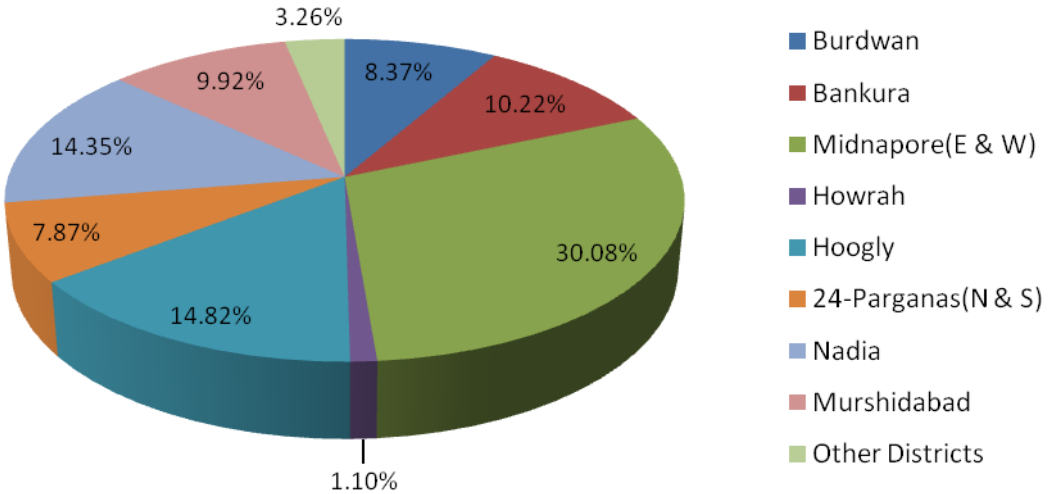
Source: Statistical Abstract (Govt. of West Bengal)-Various Issue.

Table 3.4.5: Shares of Major Districts in Production of Sesame in the State: TE 1993-94 and TE 2009-10

TE 1993-94



TE 2009-10



Source: Statistical Abstract (Govt. of West Bengal)-Various Issue.

3.5 Variability in the Growth of Area, Production and Yield of Sesame

To examine the variability in the growth of area, production and productivity of oilseeds (particularly sesame) across districts of the state, we classify districts according to the direction and magnitude (level of significance) of growth achieved during specific time periods. During the period 1981-82 to 2009-10, it can be observed that as many as 6 districts in the state have witnessed significant positive growth in area under sesame. These districts include Nadia, Midnapore (E & W), Murshidabad, 24 Parganas (North & South), Bankura and Hooghly. In contrast, a number of districts have experienced significant negative growth in area under sesame, which include districts like Malda, Dinajpur (North & South), Darjeeling, Birbhum, Howrah, Coochbehar and Purulia. At the same time, some districts have exhibited negative stagnant growth in area under sesame, which include districts like Burdwan and Jalpaiguri, while none of districts has experienced a positive stagnant growth.

Table 3.5.1: Classification of Districts according to Growth in Area under Sesame

	1980's	1990's	2000's	1981-82 to 2009-10
Significant Positive Growth in Area	Howrah(0.02) Coochbehar(0.07) 24-Paraganas(N & S)(0.10) Purulia(0.11) Nadia(0.11)	Murshidabad(1.16) Midnapur (E & W)(2.06) Nadia(2.99) Dinajpur(N & S)(3.30)	Bankura(1.72) Jalpaiguri(2.12) Hooghly(2.91) 24-Paraganas(N & S)(3.30) Burdwan(4.34) Murshidabad(4.45) Midnapur(E & W)(6.39) Nadia(4.72) Birbhum(8.87)	Hooghly(1.07) Bankura(2.98) 24-Paraganas(N & S)(3.06) Murshidabad(3.41) Midnapur(E & W)(13.12) Nadia(13.30)
Significant Negative Growth in Area	Dinajpur(N & S)(-0.59) Murshidabad(-0.98) Bankura(-1.10) Darjeeling(-1.30) Bardwan(-2.67) Birbhum(-4.05)	Bankura(-0.77) Jalpaiguri(-0.87) Bardwan(-1.03) Darjeeling(-1.10) Howrah(-1.41) Birbhum(-1.72) Coochbehar(-2.40) Purulia(-3.55)	Purulia(-0.52) Malda(-2.10) Darjeeling(-4.35) Dinajpur(N & S)(-4.95)	Purulia(-0.76) Coochbehar(-2.38) Howrah(-3.20) Birbhum(-3.24) Darjeeling(-3.30) Dinajpur(N & S)(-3.40) Malda(-4.17)
Positive Stagnant Area	Jalpaiguri(0.35)	-	Howrah(0.35)	-
Negative Stagnant Area	Midnapur(E &W)(-0.04) Hooghly(-0.35) Malda(-0.45)	24-Paraganas(N & S)(-0.08) Malda(-0.19) Hooghly((-0.47)	Coochbehar(-0.11)	Burdwan(-0.17) Jalpaiguri(-0.46)

Source: Statistical Abstract (Govt. of West Bengal)-Various Issue.

It should be noted here that there exists much variability across districts in the growth of area under sesame. In fact, the direction and magnitude of growth in area for the districts kept on changing from decade to decade. While Darjeeling appears to be the only district that has experienced negative

significant growth throughout the time period, on the other hand Nadia appears to be the only District showing significant positive growth throughout since 1980s.

In case of production of sesame over the period from 1981-82 to 2009-10, it is observed that a number of districts have registered a significant positive growth in production of sesame, especially during 2000s. These districts include districts like Nadia, Midnapur (East & West), Murshidabad, 24 Parganas (North & South), Bankura, Hooghly and Jalpaiguri. On the other hand, a number of districts have recorded significant negative growth, which include Darjeeling, Dinajpur (North & South), Birbhum, Malda, Purulia and Coochbehar. While district Burdwan has shown a positive stagnant growth in production of sesame over the period 1981-82 to 2009-10, district Howrah has experienced a negative stagnant growth in production of sesame over time.

Table 3.5.2: Classification of Districts according to Growth in Sesame Production

	1980's	1990's	2000's	1981-82 to 2009-10
Significant Positive Growth in Production	Hooghly(0.83) Howrah(1.06) Coochbehar(1.08) Midnapur(E & W)(1.40) 24-Paraganas(N & S)(2.15) Purulia(4.33)	Murshidabad(1.64) Dinajpur(N & S)(1.96) Nadia(3.99)	Howrah(0.71) Coochbehar(0.93) Midnapur(E & W)(1.24) Bankura(1.26) Burdwan(2.81) Hooghly(3.36) 24-Parganas(N & S)(4.49) Murshidaba(4.57) Nadia(4.85) Birbhum(7.13)	Jalpaiguri(1.01) Hooghly(1.52) Bankura(2.58) 24-Parganas(N & S)(4.09) Murshidabad(5.21) Midnapur(E & W)(9.51) Nadia(10.33)
Significant Negative Growth in Production	Dinajpur(N & S)(-1.31) Burdwan(-1.36) Darjeeling(-2.41)	Burdwan(-0.60) 24-Paraganas(N & S)(-1.05) Darjeeling(-1.26) Jalpaiguri(-1.32) Coochbehar(-1.87) Howrah(-2.04) Purulia(-2.19) Bankura(-2.36) Hooghly(-2.58) Birbhum(-2.90)	Purulia(-1.33) Darjeeling(-1.83) Dinajpur(N & S)(-4.55)	Coochbehar(-0.63) Purulia(-0.74) Malda(-1.24) Birbhum(-1.29) Dinajpur(N & S)(-2.22) Darjeeling(-3.93)
Positive Stagnant Production	Jalpaiguri(0.15) Bankura(0.26)	Midnapur(E & W)(0.22)	Jalpaiguri(0.41)	Bardwan(0.49)
Negative Stagnant Production	Birbhum(-0.08) Malda(-0.16) Murshidabad(-0.36)	Malda(-0.15)	Malda(-0.10)	Howrah(-0.44)

Source: Statistical Abstract (Govt. of West Bengal)-Various Issue.

In case of production of sesame too, we observe much variability in the growth of production across districts of the state. In particular, the direction and magnitude of growth in area for the districts appear to changing from decade to

decade, indicating a high degree of variability in growth of sesame production across the districts over time. It is only district Darjeeling with experienced negative significant growth in the production of sesame consistently throughout in all the decades concerned. No such district can be found having a consistent positive significant growth in production of sesame.

le 3.5.3: Classification of Districts according to Productivity Levels and Growth in Productivity of Sesame in the State

	1980's	1990's	2000's	1981-82 to 2009-10
Significant Positive Growth in Productive	Birbhum(0.68) Bankura(1.00) Malda(1.01) Howrah(1.17) Murshidabad(1.86) Nadia(1.94) Purulia(2.50) Midnapur(E & W)(2.72) Hooghly(3.08) 24-Paraganas(N & S)(4.81)	Murshidabad(0.71)	Howrah(1.47) 24-Paraganas(N & S)(1.95) Nadia(1.97) Coochbehar(2.18) Murshidabad(2.74) Malda(3.75)	Dinajpur(N & S)(0.82) Malda(1.04) Hooghly(1.33) Burdwan(2.08) 24-Paraganas(N & S)(2.46) Jalpaiguri(2.49) Midnapur(E & W)(3.24) Birbhum(4.24) Nadia(4.74) Coochbehar(4.83) Murshidabad(4.86) Howrah(4.90)
Significant Negative Growth in Productive	Jalpaiguri(-0.54) Dinajpur(N & S)(-1.01) Coochbehar(-1.28) Darjeeling(-2.33)	Darjeeling(-0.92) 24-Paraganas(N & S)(-1.23) Birbhum(-1.28) Coochbehar(-1.33) Midnapur(E & W)(-1.38) Dinajpur(N & S)(-1.41) Jalpaiguri(-1.51) Purulia(-1.88) Bankura(-2.64) Howrah(-3.33) Hooghly(-3.93)	Bankura(-0.70) Burdwan(-1.10)	Darjeeling(-1.78)
Positive Stagnant Productive	Burdwan(0.30)	Malda(0.02) Nadia(0.03) Burdwan(0.38)	Darjeeling(0.04) Dinajpur(N & S)(0.20) Purulia(0.36) Birbhum(0.41) Hooghly(0.45)	Bankura(0.26) Purulia(0.40)
Negative Stagnant Productive	-	-	Jalpaiguri(-0.37) Midnapur(E & W)(-0.41)	-

Source: Statistical Abstract (Govt. of West Bengal)-Various Issue.

In case of growth in productivity of sesame, it is interesting to observe that most of the concerned districts of the state have experienced a positive significant growth in productivity over the time period 1981-82 to 2009-10. Other districts

like Bankura and Purulia have experienced positive but insignificant growth in productivity over the period. It is only district Darjeeling that experienced the opposite, i.e. a negative significant growth over the period. Note here that during the 1990s, a large number of districts experienced negative significant growth, while only Murshidabad experienced a positive significant growth. However, the situation changed dramatically in the following decade in 2000s, which again establishes that there exists enough variability in area, production as well as productivity of sesame across districts of the state.

4

Problems and Prospects of Oilseeds Production: An Empirical Analysis

4.1 Main Features of Agriculture in Selected Districts

The prime objective of this chapter is to analyze the problems and prospects of oilseeds production in the study area based on primary data collected through field survey. However, before we move on to analyze the empirical findings, it remains necessary to introduce the main features of agriculture in the selected districts of the study. This has been presented as follows-

4.1.1: Bankura District

Agriculture accounts for almost 70% of the district's income whereas 80% of the farmers are small & marginal. However due to protective irrigation system, land reforms and use of high fertile & hybrid crops the district is now not so poor as it was. A vast area of Bankura is not cultivable due to undulation of land and morum soil. Still the rest of the land (about 60 - 65%) is fertile and due to availability of sufficient water supplied by either by canal or deep tube wells. Several mini artificial water reservoirs ("bandh" or barrages) are also available.

Now a days the district cultivate it requires crops. Net cultivable area of the District is 4.30 lakh ha. and nos. of cultivator is 4.47 lakhs and per cultivator availability of net shown area comes to 1.02 ha. Due to continuous division and fragmentation of cultivated land agriculture is becoming less remunerative. About 46% of the net cropped area is under irrigation. The gross cropped area is about 6 lakh ha. and cropping intensity is 147%. Rice, Wheat, Oil seeds and Vegetables are the Principal Crop occupied major of the gross cropped area. Most of the Pre-Kharif and Kharif rice are grown in rain-fed condition. H.Y.V. crops occupied about 9% in this district considering 100% in summer rice. Wheat is second most important cereal crop in the district and crop is cultivated in assured / limited irrigated areas. Among different Oil seeds, Rape & Mustard, and Sesame are two important oil seeds grown in this district Sesame is cultivated in 3 seasons while Rape & Mustard is cultivated during Rabi season.

Table 4.1.1: Area & Production of Selected Crops
Bankura Districts: 2010-11

Crop	Area		Production	
	In ha.	%	tonnes	%
Paddy	198022	28.78	761235	25.11
Wheat	3013	0.44	6839	0.23
Total Cereals	201426	29.27	515080	16.99
Total Pulses	191	0.03	149	0.00
Total Foodgrains	201617	29.30	515229	17.00
Total Sesame (Til)	17403	2.53	12450	0.41
Rapeseed & Mustard	8186	1.19	6687	0.22
Linseed	10	0.00	3	0.00
Sunflower	466	0.07	857	0.03
Total Groundnut	610	0.09	873	0.03
Castor	-		-	
Safflower	-		-	
Niger	-		-	
Total Oilseeds	26675	3.88	20870	0.69
Total Fibres	193	0.03	708	0.02
Sugarcane	1	0.00	38	0.00
Total Potato	30294	4.40	1190404	39.27
		100.00		100.00

Source: Evaluation Wing, Directorate of Agriculture, West Bengal

4.1.2: Nadia District

Nadia remains evergreen with seasonal field crops throughout the year for its plenty of underground water and soil type (new alluvium). Almost all the important crops are profitably grown in this district the economy of which depends mainly on agriculture. Farmers of this district are progressive in mind to adopt new technology for development of agriculture. Net cropped area is 2,72,135 hectares. However, cropped area is decreasing slowly owing to necessity of conversion of agricultural land for construction of dwelling houses thereon. In spite of the high rate of growth of population, there has been no deficit of food grains in the district during the last three decades.

It is worth mentioning here that the area under cultivation of oilseeds went up remarkably from 16,794 hectares in 1976-77 to 1,08,913 hectares in 2000-01 and the production increased from 9,328 M.T. in 1976-77 to 99,989 M.T. in 2000-01. This success is due to the introduction of H.Y.V. seeds of mustard, groundnut etc. and application of the improved technology of crop management and pest management.

Table 4.1.2: Area & Production of Selected Crops
Nadia Districts: 2010-11

Crop	Area		Production	
	In ha.	%	tonnes	%
Paddy	235737	18.96	975703	20.72
Wheat	38740	3.12	98264	2.09
Total Cereals	277232	22.30	755748	16.05
Total Pulses	45784	3.68	44580	0.95
Total Foodgrains	323016	25.98	800328	17.00
Total Sesame (Til)	20529	1.65	21829	0.46
Rapeseed & Mustard	72847	5.86	74915	1.59
Linseed	536	0.04	322	0.01
Sunflower	17	0.00	26	0.00
Total Groundnut	6316	0.51	11193	0.24
Castor	-		-	
Safflower	-		-	
Niger	-		-	
Total Oilseeds	100245	8.06	108285	2.30
Total Fibres	114621	9.22	1566184	33.27
Sugarcane	710	0.06	57645	1.22
Total Potato	7073	0.57	193100	4.10
		100.00		100.00

Source: Evaluation Wing, Directorate of Agriculture, West Bengal

4.1.3: North 24 Parganas District

Agriculture is the main stay of the people of North 24 Parganas. The regional homogeneity with the sufficient rainfall is conducive for the prosperity of Agriculture. Agriculture supports the economy of North 24 Parganas, on a large scale. Rice, jute, coconuts, potatoes, wheat and rapeseed are the principal crops produce here. The orchard cultivation and horticulture supplements the economy to a desirable extent. Mangoes, Guavas and Bananas are exported on a large scale.

The small and marginal farmer dominated agriculture of North 24-Parganas, which recorded very good performance in production and productivity of agricultural crops. The yield rate of rice in the district is 2589 kg/hectare, which is above the state average. Rice is the major cereal which accounts for more than 95 percent of total cereal produced in the district. Traditional aman crop is still the major crop of the district, followed by the summer paddy.

Among the non-cereals, the district produces jute and potato along with oilseeds (till and mustard). Till and mustard, the oilseeds are produced in 9343 ha and 32263 ha respectively. Area under mustard is the highest in Bongaon (4972 ha), followed by Bagdah (4265 ha). The yield rate of mustard is the highest in Bongaon (1457 kg/ha). Till is grown mostly in Bagdah, Bongaon and Gaighata

region. These three blocks account for about 40 percent of the area under till production in 2005-06. Wide variation in the productivity of both Till and Mustard is observed in the performance of various blocks in the production of oilseeds. Thus in Bagdah, the yield rate of Mustard is 1021.45 kg/ha. In Bongaon the yield rate is even higher (1457 kg/ha). In Hingalganj, on the other hand the yield rate of Mustard is 571.5 kg/ha only. With respect to the production of till also inter-block variation in productivity does exist. However, the productivity variation in case of Till is low because the production of this oilseed does not depend much on irrigation.

Table 4.1.3: Area & Production of Selected Crops
North 24 Parganas Districts: 2010-11

Crop	Area		Production	
	In ha.	%	tonnes	%
Paddy	223725	25.98	909828	24.71
Wheat	7361	0.85	19720	0.54
Total Cereals	231249	26.86	626701	17.02
Total Pulses	7802	0.91	7097	0.19
Total Foodgrains	239051	27.76	633798	17.21
Total Sesame (Til)	6219	0.72	7024	0.19
Rapeseed & Mustard	37474	4.35	52882	1.44
Linseed	-		-	
Sunflower	606	0.07	709	0.02
Total Groundnut	1293	0.15	2585	0.07
Castor	-		-	
Safflower	42	0.00	58	0.00
Niger	-		-	
Total Oilseeds	45634	5.30	63258	1.72
Total Fibres	50544	5.87	959771	26.07
Sugarcane	824	0.10	66901	1.82
Total Potato	9164	1.06	331334	9.00
		100.00		100.00

Source: Evaluation Wing, Directorate of Agriculture, West Bengal

4.2 Main Features of Sample Households: Land Ownership Pattern, Cropping Pattern, etc.

After a brief description of agriculture in the study area, we may now describe the empirical evidences gathered from field survey conducted in the region. This has been presented here in the following sub-sections:

4.2.1 Socio-Economic Status

In case of socio-economic status of the sample households, it is observed that average age of the respondents stands at around 46 years 7 months. Though average calculated for different size-categories (viz. marginal, small and medium) vary to some extent, no systematic pattern of variation can be observed.

Again, a cross distribution of primary occupation shows that about 95.60 percent of sample households consider crop farming as their primary occupation. Only a few farm households are primarily engagement in service (2.40 percent) and other miscellaneous occupations (2.00 percent).

Average level of education for the farm households scored quite high at 12.73. However, average education score shows an increasing trend over increase in size-classes, indicating a positive relationship between higher educational achievement and greater economic affluence (as indicated by larger farm sizes).

Further, the average family size for the sample households stands at near about 6 persons per family, with a male-female ratio inclined more towards male members. This gender bias in favour of males is observed consistently for all the size-classes concerned. It should also be noted that average family size, just as educational attainment, shows a positive relationship with greater economic affluence (as indicated by larger farm size).

Table 4.2.1: Socio-economic Status of sample households

Indicators	Marginal	Small	Medium	Large	All Farms
Age (years)	46.49	43.16	50.47	-	46.59
Main Occupation (%)					
Crop farming	63.60	16.80	15.20	-	95.60
Service	0.80	0.40	1.20	-	2.40
Farm Labour	0.00	0.00	0.00	-	0.00
Others	1.60	0.00	0.40	-	2.00
Education (years of schooling)	11.77	14.53	14.64	-	12.73
Average Family Size (no)					
Male	2.98	2.95	3.52	-	3.06
Female	2.57	2.79	3.23	-	2.72
Social Groups					
General	14.80	3.20	4.80	-	22.80
SC	13.60	5.20	2.40	-	21.20
ST	2.00	0.00	0.40	-	2.40
OBC	35.60	8.80	9.20	-	53.60
Others	0.00	0.00	0.00	-	0.00
Head of household (%)					
Male	65.60	17.20	16.80	-	99.60
Female	0.40	0.00	0.00	-	0.40

Source: Field Survey

In case of distribution of sample households across social groups, it is observed that the sample pool is dominated by families belonging to the Other Backward Classes (53.60 percent), followed by the General Castes (22.80 percent), and the Scheduled Castes (21.20 percent). Only about 2.40 percent of sample households belong to the Scheduled Tribes.

Lastly, in case of household decision making, it is observed that almost all sample households are headed by male members, which in turn reflects a male-dominated communal system.

4.2.2 Land Ownership Pattern

The pattern of land ownership by the sample households reveal that the average size of operational holding stands at 1.23 hectares, which gets irrigation from various sources. Only parts of owned land remains un-irrigated, which is left fallow as well. On the whole, data reveals that area covered under the present survey largely remains irrigated with little fallow land to waste.

Table 4.2.2: land ownership pattern on sample households*(ha)*

Indicators	Marginal	Small	Medium	Large	All Farms
Total owned land					
Irrigated	0.540	1.360	3.550	-	1.180
Un-irrigated	0.002	0.009	0.010	-	0.940
Area under cultivation					
Irrigated	0.530	1.360	3.500	-	1.170
Un-irrigated	0.000	0.000	0.000	-	0.000
Leased-in land					
Irrigated	0.090	0.050	0.020	-	0.070
Un-irrigated	0.000	0.000	0.000	-	0.000
Leased-out land					
Irrigated	0.005	0.006	0.050	-	0.010
Un-irrigated	0.000	0.000	0.000	-	0.000
Total Operational holding (2+3-4)					
Irrigated	0.620	1.400	3.470	-	1.230
Un-irrigated	0.000	0.000	0.000	-	0.000

Source: Field Survey

It should however be noted here that incidence of leasing-in of land for cultivation on an average is higher for the smaller size-classes, as compared to their larger counterparts. This is understandable as tendency for leasing-in is higher among the smaller farms, while the opposite may be observed in case of leasing-out of cultivable land.

4.2.3 Terms of Lease

To continue with our previous discussion on leasing-in/out of land, we here observe that the incidence of leasing-in of land is much higher for the smaller farms, especially the marginal farms (17.2 percent) as compared to the medium farms (0.40 percent). Furthermore, an overwhelming majority (93.75 percent) of these lease contracts/arrangements are carried out on fixed rent in cash. Lease arrangements on conditions of fixed rent in crop produce is observed only in a few instances of lease-in contracts, specifically with the resource poor marginal farms. However, it comes out that the money-equivalent of such payments in raw produce is almost comparable with rent in cash.

Table 4.2.3: Terms of lease

Farm Size	Incidence of lease (%)		Terms of Leasing (%)				Terms of Lease (Rent/amount)	
	% area leased-in	*% HHs leasing in*	*For fixed money*	*For fixed produce*	*Share Cropping*	*Others*	*Fixed money*	*Fixed produce*
Marginal	14.52	17.2	93.02	6.98	0.00	-	13187.00	13000.00
Small	3.57	1.60	100.00	0.00	0.00	-	16550.00	-
Medium	0.58	0.40	100.00	0.00	0.00	-	17500.00	-
Large	-	-	-	-	-	-	-	-
All farms	5.69	19.20	93.75	6.25	0.00	-	13866.00	13000.00

Source: Field Survey

Interestingly enough, it is observed during the survey that average rate of rent per hectare tends to increase with increase in farm-size. This might be because of the fact that the larger farms lease-in better quality land with higher rent, while the smaller farms cannot afford to do so; but such explanations need further investigation into the lease-market for agricultural lands.

4.2.4 Sources of Irrigation

As has been mentioned earlier, the present empirical survey covers an area which is largely irrigated in nature, the major source of irrigation being groundwater sources. In fact, more than 96 percent of area covered under the present survey is irrigated from groundwater sources. In contrast, the share of irrigated land endowed with surface water irrigation accounts for less than 4 percent. Also to be noted again is the fact that the entire cropped area remains irrigated from either of the sources, viz. surface water and groundwater. This is consistently true for all the size classes.

However, apart from surface water or groundwater sources of irrigation, availability of irrigation from tanks or other sources like river lift irrigation is absent from the coverage of the present study.

Table 4.2.4: Irrigation Sources

Indicators	Marginal	Small	Medium	Large	All Farms
Area under irrigation (% to total cropped area)	100.00	100.00	100.00	-	100.00
Sources of irrigation (%)					
Surface	4.82	0.00	4.45	-	3.74
Groundwater	95.18	100.00	95.55	-	96.26
Tanks	0.00	0.00	-	-	0.00
Others	0.00	0.00	-	-	0.00

Source: Field Survey

4.2.5 Cropping Pattern

The cropping pattern of a particular region provides valuable insights into the nature farming practiced in the concerned region. It is here that the present study finds that the principal crops (based on area covered) of the study region is kharif paddy, followed by summer paddy and wheat among the cereals.

Table 4.2.5: Cropping Pattern*(ha)*

Season/Crop	Marginal	Small	Medium	Large	All Farms
Kharif					
Rice					
Irrigated	73.43 (0.4450)	45.99 (1.0695)	110.36 (2.6276)	-	229.78 (0.9191)
Unirrigated	-	-	-	-	-
Rabi					
Wheat					
Irrigated	18.58 (0.1126)	9.68 (0.2251)	25.34 (0.6033)	-	53.46 (0.2144)
Un-irrigated	-	-	-	-	-
Oilseeds					
Rapeseed & Mustard					
Irrigated	42.68 (0.2587)	22.31 (0.5188)	35.27 (0.8398)	-	100.26 (0.4010)
Un-irrigated	-	-	-	-	-
Sunflower					
Irrigated	1.73 (0.0105)	1.19 (0.0277)	3.56 (0.0848)	-	6.48 (0.0259)
Un-irrigated	-	-	-	-	-
Summer crops					
Summer paddy					
Irrigated	56.94 (0.3451)	35.13 (0.8170)	101.39 (2.4140)	-	193.46 (0.7738)
Un-irrigated	-	-	-	-	-
Sesame					
Irrigated	28.41 (0.1722)	18.41 (0.4281)	21.93 (0.5221)	-	68.75 (0.2750)
Un-irrigated	-	-	-	-	-

Source: Field Survey; Figures in parenthesis indicate averages

Among the non-cereal crops, a large area under cultivation is devoted to mustard, followed by sesame and sunflower. The principal oilseed crop comes out to be mustard. It should be noted here that cultivation of rapeseed is quite limited not only in the study region, but also in case of other parts of the state.

4.2.6 Average Yield of Major Crops

In case of average yield of principal crops grown in the study region, it is observed that yield rate of kharif paddy stands at 53.32 quintals per hectare, and that for boro (summer) paddy stands at 48.67 quintals per hectare. In case of kharif paddy, average yield rate shows a sharp increase over increase in size, though such pattern is not observed in case of summer paddy. However, average yield of wheat stands at 26.11 quintals per hectare, which too shows a direct relationship with farm size.

Table 4.2.6: Average yield of major crops on sample households *(q/ha)*

Season/Crop	Marginal	Small	Medium	Large	All Farms
Kharif					
Rice					
Irrigated	51.27	53.20	54.73	-	53.32
Unirrigated	-	-	-	-	-
Rabi					
Wheat					
Irrigated	24.39	25.78	27.50	-	26.11
Un-irrigated	-	-	-	-	-
Oilseeds					
Rapeseed & Mustard					
Irrigated	10.84	10.67	10.85	-	10.80
Un-irrigated	-	-	-	-	-
Sunflower					
Irrigated	20.71	23.75	30.44	-	26.65
Un-irrigated	-	-	-	-	-
Summer crops					
Summer paddy					
Irrigated	50.17	50.46	47.69	-	48.67
Un-irrigated	-	-	-	-	-
Sesame					
Irrigated	10.62	11.54	12.19	-	11.36
Un-irrigated	-	-	-	-	-

Source: Field Survey

In case of yield rate of oilseeds, it is observed that average yield rate for mustard stands at 10.80 quintals per hectare, while that for sesame stands at 11.36 quintals per hectare. Though not present in case of mustard, we can observe a direct relationship between yield rate per hectare and farm-size in case of sesame also. However, yield rate of sunflower stands much higher at an average of 26.65 quintals per hectare. Further, in case of sunflower too, we observe that average yield per hectare tends to show an increasing pattern over increase in farm-size,

denoting greater effort from the part of the smaller farms to enhance production and productivity.

4.3 Production, Retention and Marketed Surplus Pattern of Oilseeds

In this section, an attempt has been made to enumerate some key economic indicator like production, retention and sale of different oilseeds cultivated in the study region. In particular, here we elaborate these key indicators for the cultivation of rabi oilseeds (viz. mustard and sunflower) and summer oilseed (viz. sesame). This has been discussed as follows:

4.3.1 Production, Retention and Sale of Rabi Oilseed I (Mustard)

In case of production of mustard, it is observed that average production of mustard steadily increases with increase in farm-size, which is quite obvious under the present circumstances. However, in case of retention, it is observed that a progressively lower proportion of mustard produced is retained back, while a progressive higher proportion of mustard is marketed over increase in farm-size. This in turn indicates that as farm size increase, retention for family consumption also increases but at a proportionately lower rate than marketed surplus. It however may also be noted here that higher size-classes fetch a higher average price for their marketed surplus of mustard as compared to their smaller counterparts.

Table 4.3.1: Total Oilseeds production, retention and sale pattern *(q)*

	Rabi Oilseed I(Rapeseed & Mustard)				*Rabi Oilseed II(Sunflower)*			
	Production	*Retention*	*Sold*	*Price (Rs/q)*	*Production*	*Retention*	*Sold*	*Price (Rs/q)*
Marginal	2.81	1.01	1.80	2956.00	1.76	0.56	1.20	3144.00
Small	5.54	1.24	4.30	3029.00	2.59	0.58	2.01	3182.00
Medium	9.11	1.77	7.33	3090.00	7.76	1.08	6.68	3400.00
Large	-	-	-	-	-	-	-	-
All farms	4.35	1.18	3.17	2995.00	3.83	0.88	2.95	3305.00
	Summer Oilseed I(Sesame)				*Summer Oilseed II*			
	Production	*Retention*	*Sold*	*Price (Rs/q)*	*Production*	*Retention*	*Sold*	*Price (Rs/q)*
Marginal	2.18	0.69	1.49	2688.00	-	-	-	-
Small	5.73	1.15	4.58	2762.00	-	-	-	-
Medium	7.03	1.11	5.92	2745.00	-	-	-	-
Large	-	-	-	-	-	-	-	-
All farms	3.66	0.85	2.80	2713.00	-	-	-	-

Source: Field Survey

4.3.2 Production, Retention and Sale of Rabi Oilseed II (Sunflower)

In case of production of sunflower, similar trends may be observed as in case of mustard, but at a lower magnitude. In particular, average production of

sunflower shows an increasing trend over increase in farm-size. Retention and marketed surplus of sunflower also tends to increase with increase in farm size, but that increase is proportionate much sharper in case of marketed surplus of sunflower than its retention. Average price received per quintal of sunflower also shows an increasing pattern with increase in farm-size, especially for the medium farms.

4.3.3 Production, Retention and Sale of Summer Oilseed I (Sesame)

In case of production, retention and sale of summer oilseed, viz. sesame, we also witness likewise pattern as mustard and sunflower. In particular, average production and average marketed surplus shows an increasing pattern with increase in farm size. However, in case of retention such a pattern is not well established. Also, average prices fetched per quintal of sesame remains the highest for the small farms, followed by the medium and the marginal farms.

Lastly, comparing prices fetched by the farms for the different oilseeds, it is noticeable that average price per quintal of produce is the highest for sunflower (Rs. 3305/qtl.) followed by mustard (Rs. 2995/qtl.) and sesame (Rs.2713/qtl.). However, both average sale and average retention is the highest for mustard being 3.17 qtl. per household and 1.18 qtl. per household.

4.4 Comparative Economics/Profitability of Oilseeds vis-à-vis competing Crop(s)

In this section, we try to investigate into the comparative economics of oilseed (here, sesame) vis-à-vis competing crop (here, summer paddy). In particular an attempt has been made here to compare economics of cultivation of these competing crops side by side, as also risks associated with the cultivation of these crops. These have been presented here as follows:

4.4.1 Profitability of Major Oilseeds and Competing Crops

In case of profitability in cultivation of oilseeds (here, sesame), the results of our field investigation shows that though costs of production per unit of land is much less for sesame cultivation as compared to competing crop (summer paddy), profitability of sesame cultivation is much lower. In particular, profitability in sesame cultivation stands out to be as low as 1/3rd of that in cultivation of summer paddy. This is particularly because of the fact that value of output per unit of land is much higher for summer paddy as compared to sesame. Also, additional value is generated from by-products in summer paddy cultivation, whereas any such by-product is not obtained in the cultivation of sesame. Even though costs on account of seeds, fertilizers, insecticides & pesticides, etc. are much lower for sesame cultivation as compared to cultivation of summer paddy, lower gross value of output per unit of land in sesame cultivation in turn brings

down profit. At the same time, it is to be noted here that the two crops are merely comparable from the point of view of yield rate, as yield of sesame is much lower than that of summer paddy.

Table 4.4.1: Profitability of Major Oilseeds and Competing Crops ***(Rs/ha)***

Cost items	Oilseed I				
	Marginal	Small	Medium	Large	All Farms
Operational costs					
Seed	275.00	276.00	275.00	-	275.00
Fertilizer & manure	6395.00	6471.00	6319.00	-	6394.00
Insecticides & pesticides	1581.00	1630.00	1644.00	-	1601.00
Human labour					
Family	2818.00	2415.00	1028.00	-	2435.00
Hired	589.00	922.00	2526.00	-	1075.00
Machine labour	2078.00	3361.00	3709.00	-	2597.00
Bullock labour	1256.00	1267.00	1200.00	-	1257.00
Irrigation	1837.00	1884.00	2096.00	-	1893.00
Harvesting & threshing	5451.00	5625.00	6135.00	-	5606.00
Interest on working capital	223.00	239.00	249.00	-	231.00
1. Total Operational Costs	22503.00	24090.00	25181.00	-	23364.00
Yield (Quintals)	11.00	12.00	12.00	-	11.00
Price	2690.00	2762.00	2762.00	-	2712.00
2. Value of main-product	29590.00	33144.00	32928.00	-	29832.00
3. Value of by-product	0.00	0.00	0.00	-	0.00
Net Income (2+3) – (1)	7087.00	9054.00	7747.00	-	6468.00
Cost of production/q	2046.00	2008.00	2098.00	-	2124.00
Cost of production/ha	22503.00	24090.00	25181.00	-	23364.00
Cost items	Competing Crop I : Summer Paddy				
	Marginal	Small	Medium	Large	All Farms
Operational costs					
Seed	1540.00	1539.00	1526.00	-	1538.00
Fertilizer & manure	9592.00	9395.00	9186.00	-	9489.00
Insecticides & pesticides	2363.00	2475.00	2439.00	-	2396.00
Human labour					
Family	2881.00	2695.00	868.00	-	2539.00
Hired	889.00	1228.00	3355.00	-	1373.00
Machine labour	2539.00	3644.00	3931.00	-	2970.00
Bullock labour	2396.00	1215.00	1040.00	-	1958.00
Irrigation	1985.00	1994.00	1966.00	-	1983.00
Harvesting & threshing	8272.00	9153.00	9454.00	-	8628.00
Interest on working capital	325.00	333.00	338.00	-	329.00
Total Operational Costs	32782.00	33671.00	34103.00	-	33203.00
Yield (Quintals)	50.00	50.00	51.00	-	50.00
Price	900.00	885.00	905.00	-	898.00
Value of main-product	45000.00	44250.00	46155.00	-	44900.00
Value of by-product	7233.00	7340.00	7454.00	-	7355.00
Net Income	19451.00	17919.00	19506.00	-	19052.00
Cost of production/q	656.00	673.00	682.00	-	664.00
Cost of production/ha	32782.00	33671.00	34103.00	-	33203.00

Source: Field Survey

However, we must add here that in the study area, in general, sesame is cultivated not as a competing crop to summer paddy; but as a complementary sources of income from otherwise fallow land during the dry summer season. This is particularly because of the fact that cultivation of sesame requires much less assured irrigation and investment in other material inputs as compared to summer paddy. Hence, whatever surplus is generated from sesame cultivation is considered as additional gain from lands left fallow otherwise.

4.4.2 Profitability vis-à-vis Risks in Oilseeds production

In continuation of our analysis made above in terms of profitability of oilseed vis-à-vis summer paddy, we may now turn our focus to risks involved in the cultivation of said two competing crops. Here, it is observed that in terms of risks involved, cultivation of oilseeds appears much riskier as compared to cultivation of summer paddy. This has been true in respect of risks involved in yield, price of output as well as net income from cultivation of oilseeds, especially for the smaller farms. Variability in yield is also higher in case of oilseeds cultivation, which too is more pronounced for the smaller farms, though at the aggregative level yield variability in oilseeds cultivation is lower than that in cultivation of summer paddy.

Table 4.4.2: Profitability vis-à-vis Risks in Oilseeds production

Indicators	Marginal	Small	Medium	Large	All Farms
Main Crop Oilseed I (Sesame)					
Acreage variability	76.36	78.18	66.50	-	97.23
Yield Risk	52.91	45.56	41.98	-	49.89
Price Risk	44.95	41.50	33.76	-	42.43
Net Income Risk	144.35	88.01	116.85	-	127.52
Main Competing Crop (Summer Paddy)					
Acreage variability	47.56	41.84	64.29	-	129.87
Yield Risk	18.58	6.74	7.31	-	15.56
Price Risk	16.53	5.64	6.32	-	13.83
Net Income Risk	33.99	22.26	27.23	-	31.33

Computed values of coefficient of variation of area, yield, price and net income of main oilseeds and main competing crops
Source: Field Survey

Naturally, the question then is why farms opt for cultivation of oilseeds when it is known that it involves greater risks in terms of yield, price and net income while at the same time have a lower profitability as compared to cultivation of summer paddy? The answer might lie in the fact that the two crops, viz. sesame and summer paddy, are rather complementary crops in nature instead of being competitive. As mentioned earlier, it should be noted once again that in West Bengal sesame is cultivated in such plots which is not used for summer paddy, and that it would have been left fallow otherwise. As such whatever net return is obtained is considered as additional gain. The impetus

behind sesame cultivation even with low return is that it involves much less material investment and monitoring as compared to other competing crops. At the same time, only a few crops can be grown in summer with less demand for irrigation and moisture. Lastly, often sesame is cultivated exclusively for home consumption and not for sell at all. The straws are used as fuel for cooking and parboiling of paddy at home. It is mainly these reasons that insist farms to take up sesame cultivation in summer, even incurring higher risks with lower return.

4.5 Access to Improved Technology and Markets for Oilseeds

With regard to access to technology in oilseeds cultivation, the survey finds that all the sample farms belonging to all size-classes use high yielding varieties of seeds. This in turn shows acceptance of modern technology among the farms in terms of use of HYV seeds However, a majority of the farms have been found using seeds obtained from various sources, while about 38.8 percent of farms purchase seeds directly from the market, especially the larger farms.

Table 4.5: Access to Improved Technology and Markets (%)

	Marginal	Small	Medium	Large	All Farms
Use of HYV					
Yes	100.00	100.00	100.00	-	100.00
No	0.00	0.00	0.00	-	0.00
Area under HYV (% to total area under oilseeds)	100.00	100.00	100.00	-	100.00
Source of Seed					
Market purchased	38.18	37.21	42.86	-	38.80
Other Sources	61.82	62.79	57.14		61.20
Use of recommended doses of fertilizers					
Yes	0.00	0.00	0.00	-	0.00
No	15.76	13.95	7.14	-	14.00
Don't know	84.24	86.05	92.86	-	86.00
Awareness about MSP					
Yes	0.00	0.00	0.00	-	0.00
No	100.00	100.00	100.00	-	100.00
MSP (Rs/q) – 2011-12*					
Crop I (Sesame/Sesame)	2850.00	2850.00	2850.00	2850.00	2850.00
Price realization					
≥MSP	0.00	0.00	0.00	-	0.00
<MSP	100.00	100.00	100.00	-	100.00
Marketing problems					
Yes	100.00	100.00	100.00	-	100.00
No	0.00	0.00	0.00	-	0.00

** MSP of Sesame is not-announced*
Source: Dept. of Agril., Govt. Of India; Field Survey

Interestingly enough, it has been observed during the survey that an overwhelming majority of the farms do not know about the recommended dose

of fertilizers to be applied in sesame cultivation. The farms in general follow a set trend of pattern of input application, which is copied by other farmers in the region. In fact, no scientific norms (like soil testing, etc.) is considered while fixing the dose, rather recommendation from fertilizer seller are often assigned undue importance.

On the part of marketing of oilseeds the most peculiar observation is that none of the sample farms precisely know what the marginal support price for sesame is. In fact, in these regions, market price of sesame is largely fixed by oligopolistic petty traders, and the farms are compelled to sell their output at price dictated by them. Hence it is not surprising to find that price realized remains much lower than MSP for all the farms concerned, and that they definitely have problems in marketing their oilseeds in the market.

4.6 Yield Gap Analysis

In case of yield gap analysis, the results of our primary survey show us some interesting results. It is interestingly observed that actual farm yield is higher than both experimental yield (in demonstration plots of department of agriculture, government of West Bengal) and potential yield. This holds true consistently for all the size-classes. In fact, the figure for potential yield dates back to 1973 when the particular variety (B-67 or Tilottama) was released. Over time, there has been much improvement in cultivation practices and application of modern inputs, which in effect has increased the yield rate of the variety under consideration. Furthermore, the experimental yield from the state government farms has been lower than the actual farm yield consistently for all the size classes. It should however be mentioned here that the figure for experimental yield varies from district to district, depending upon variations in agro-climatic conditions. Hence, the figure for experimental yield considered here is the average experimental yield of the experiments conducted by the state agriculture farms of the concerned three districts. Nevertheless, it is true that in each district, actual farm yield is higher than experimental yield of the corresponding district, and that average yield rate shows an increasing pattern with the increase in farm-size.

Table 4.6: Yield Gap Analysis

Yield	Marginal	Small	Medium	Large	All Farms
1. Experimental Farm Yield	1067.00	1067.00	1067.00	1067.00	1067.00
2. Potential Farm Yield	750.00	750.00	750.00	750.00	750.00
3. Actual Farm Yield	1152.00	1172.00	1163.00	-	1092.00
Yield Gap I (1-2)	317.00	317.00	317.00	-	317.00
Yield Gap II (2-3)	-402.00	-422.00	-413.00	-	-342.00

Source: Dept. Of Agril., Govt. Of India; Dept of Agril., Govt. Of W.B., and Field Survey

4.7 Perceived Constraints in Cultivation of Oilseed Crops

The constraints in oilseed cultivation as perceived by the farms have been presented here in the following table indicating composite indices of the constraints.

Table 4.7: Composite Index of Constraints in cultivation of oilseeds crops

Constraints	Marginal	Small	Medium	Large	All Farms
Technological					
Non-availability of suitable varieties	87.42	95.35	85.71	-	88.50
Poor crop germination	96.97	97.09	92.86	-	96.30
Lack of irrigation facilities	57.73	55.23	50.60	-	56.10
Incidence of diseases	80.45	80.81	73.21	-	79.30
Incidence of insect pests	80.45	72.67	73.81	-	78.00
Weeds Infestation	73.79	77.33	71.43	-	74.00
Poor quality of soils	55.45	54.65	52.38	-	54.80
Agro-climatic Factors					
Drought at critical stages of crop growth	91.36	92.44	89.29	-	91.20
Excessive rains	90.30	93.02	91.67	-	91.00
Extreme variations in temperature	73.03	81.40	77.38	-	75.20
Poor pod/grain setting	75.00	75.00	72.62	-	74.60
Risk of crop failure/yield variability due to	63.64	64.53	61.31	-	63.40
Economic					
High-input cost (diesel, fertilizers,	83.03	76.74	72.02	-	80.10
Shortage of human labor	80.30	84.88	77.38	-	80.60
Low and fluctuating prices	93.18	94.77	87.50	-	92.50
Price risks – Fear of glut leading to low price	78.33	77.91	75.60	-	77.80
Oilseeds less profitable compared with other	48.33	43.60	54.17	-	48.50
Oilseeds more risky compared with other	49.85	46.51	53.57	-	49.90
Institutional					
Problem of timely availability of seed	90.30	94.19	89.88	-	90.90
Non-availability of other inputs	66.52	63.37	55.36	-	64.10
Poor quality of inputs	61.21	67.44	60.71	-	62.20
Lack/Poor extension services	48.94	53.49	49.40	-	49.80
Non-availability of institutional credit	69.09	66.28	61.31	-	67.30
Inadequate knowledge about disease and pest	73.33	73.84	75.60	-	73.80
Irregular supply of power/electricity	40.00	34.88	30.36	-	37.50
Lack of awareness of improved oilseed	55.76	52.33	45.24	-	53.40
Post-harvest, Marketing and Value-addition					
Poor marketing system and access to markets	25.00	25.00	25.00	-	25.00
Lack of information about prices and markets	48.79	46.51	45.83	-	47.90
Exploitation by market intermediaries	99.09	95.35	98.81	-	98.40
Lack of processing facilities in the area	58.33	56.40	54.17	-	57.30
Lack of appropriate transport means	44.70	49.42	41.07	-	44.90
Inadequate storage facilities	58.18	51.74	50.60	-	55.80
Poor road infrastructure	37.42	36.05	36.90	-	37.10
High transportation costs	49.55	46.51	48.21	-	48.80

Source: Dept. Of Agril., Govt. Of India; Dept of Agril., Govt. Of W.B., and Field Survey

Among the technological constrained as perceived by the farmers, it is observed that the major bottlenecks are poor crop germination (96.3 percent), followed by non-availability of suitable varieties of sesame (88.5 percent), incidence of deceases (79.3 percent), pests (78 percent) and weeds (74 percent). Factors like lack of irrigation facilities (56.1 percent) and poor soil quality (54.8 percent) are also perceived as constraints in the cultivation of oilseeds.

Considering various agro-climatic factors acting as constraints in sesame cultivation, it is observed the on the one extreme, drought at critical stages of crop growth (91.2 percent) and excessive rains (91 percent) on the other extreme, are perceived as major agro-climatic constraints. Other factors like extreme variations in temperature (75.2 percent), poor grain setting (74.6 percent) and crop failure or yield variability (63.4 percent) are also considered as major threats in the cultivation of sesame.

Among the various economic constraints, a few important ones are low and fluctuating prices (92.5 percent), high input costs (80.1 percent) and shortage of human labour (80.6 percent). Other economic constraints, as perceived by the respondents, include price risks (77.8 percent) and other risks (49.9 percent) in cultivation of sesame as compared to other competing crops, and lower profitability in sesame cultivation (48.5 percent).

Among the institutional bottlenecks, the problem of timely availability of seeds stands out as the single major bottleneck in the cultivation of sesame, as perceived by 90.9 percent of the respondents. Other major institutional bottlenecks include inadequate knowledge about deceases (73.8 percent), non-availability of institutional credit (67.3 percent), non-availability of other inputs (64.1 percent), poor quality of inputs (62.2 percent), lack of awareness of improved oilseeds (53.4 percent), lack of extension services (49.8 percent) and irregular supply of electricity/power (37.5 percent).

Lastly, among the constraints faced in the post-harvest period, the single major bottleneck appears to be exploitation by market intermediaries as perceived by as high as 98.4 percent of the respondent farmers. This is followed by lack of processing facilities in the area (57.3 percent), inadequate storage facilities (55.8 percent), high transportation costs (48.8 percent), lack of information about price (47.9 percent), lack of appropriate means of transportation (44.9 percent), poor road and infrastructure (37.1 percent) and poor marketing system (25 percent).

As such, it comes out that there are numerous constraints in the cultivation of oilseeds in the study region. It is practically not feasible to address each of them. Hence, the problems should be prioritized while designing relief measures/schemes by the government or concerned authorities. Our analysis sheds light on these constraints and can be particularly useful in such government efforts.

4.8 Marketing Pattern of Oilseeds

It has been observed during the survey that marketing of oilseeds (sesame) mostly occurs in a personalized manner where a major part of the output is sold to the processing mills (46.89 percent), followed by the local village traders (36.24 percent) and the commission agents (16.89 percent). However, there are variations in preference for particular marketing agencies among different size-class of farms. It comes out that while the smaller farms prefer to market their product to local village traders, majority of the larger farms sell their product to processing units. This has been particularly because of the fact that the smaller farms are often obliged to take advances (loans) from the local village traders under the implicit condition that they have to repay their loan in terms of output at prices largely determined by the local traders. As such, it is not very surprising to find that average price received is lower for the resource-poor marginal farms. The only advantage for the smaller farms in preferring local traders as their marketing agency is that they do not have to `transport their output to great distances. This has been substantiated by the fact that the average distance to sale point is the lowest for the marginal farms, followed by the small and medium farms.

Table 4.8: Sale Pattern of major oilseeds (Sesame)

	Marginal	Small	Medium	Large	All Farms
Agency to whom sold (% share)					
Local village trader	45.40	50.73	16.41	-	36.24
Processing mill	42.84	30.31	63.36	-	46.87
Government agency	0.00	0.00	0.00	-	0.00
Commission agent	11.76	18.96	20.22	-	16.89
Private company (contract arrangement)	0.00	0.00	0.00	-	0.00
Others	0.00	0.00	0.00	-	0.00
Price Received (Rs/q)(Avg.)					
Local village trader	2693.10	2706.25	2750.00	-	2722.09
Processing mill	2673.08	2687.50	2721.05	-	2686.21
Government agency	-	-	-	-	-
Commission agent	2700.00	2760.00	2800.00	-	2783.33
Private company (contract arrangement)	-	-	-	-	-
Others	-	-	-	-	-
Average Distance to sale point (km)	0.78	1.05	1.74	-	0.99

Source: Field Survey

4.9 Sources of Technology and Market Information

During the survey, it has been observed that technical knowhow about variety of seeds to be used is largely obtained from two major sources, viz. State Department of Agriculture (40.8 percent) and Retail Market (38.8 percent). Apart from farmers using of homestead seeds (14.4 percent), only about 6.0 percent of farmers obtain information about seeds from fellow farmers.

While considering extension services, it has been observed that State Department of Agriculture is the only extension service provider for all the sample farms. No other agencies like state agriculture universities, krishi vigyan kedras, etc. have provided extension services to the farmers regarding sesame cultivation.

Table 4.9: Sources of Technology and market information (%)

	Marginal	Small	Medium	Large	All Farms
Seeds					
Own	16.36	13.95	7.14	-	14.40
Fellow farmer	3.03	13.95	9.52	-	6.00
State Dept. of Agri.	42.42	34.88	40.48	-	40.80
ICAR/SAU/KVK	0.00	0.00	0.00	-	0.00
Commission agent/ Ahrtiya	0.00	0.00	0.00	-	0.00
Market	38.18	37.21	42.86	-	38.80
Others (specify)	0.00	0.00	0.00	-	0.00
Extension Services					
State Dept. of Agri.	100.00	100.00	100.00	-	100.00
Private company	0.00	0.00	0.00	-	0.00
Input dealer	0.00	0.00	0.00	-	0.00
SAU/ICAR/KVK	0.00	0.00	0.00	-	0.00
Others (specify)	0.00	0.00	0.00	-	0.00
Market Information					
Radio/TV	70.30	97.67	100.00	-	80.00
Print media	84.85	95.35	95.24	-	88.40
Fellow farmer	100.00	100.00	100.00	-	100.00
APMC mandi	0.00	0.00	0.00	-	0.00
Commission agent/ Ahrtiya	100.00	100.00	100.00	-	100.00
Private company	0.00	0.00	0.00	-	0.00
Others (specify)	74.55	95.35	64.29	-	76.40

Source: Field Survey

On the part of the sources of information regarding market and price of output, it has been observed that the major sources are fellow farmers (100 percent), and local traders/commission agents (100 percent). Other major sources of market information include print media (88.4 percent) and radio/TV (80 percent). Another major source of market information are agencies like processing mills, local stockiest, etc., as 76.4 percent of the farms access market information from these agencies. None of the farmers have obtained information from private companies and APMC mandi. In fact, there is no APMC mandi in the study region, and hence such an option is not available to the farmers.

4.10 Suggestions for Improving production and Productivity of Oilseeds

Among the suggestions forwarded by the sample farms for improving production and productivity of oilseeds (sesame), the most strongly suggested factor is the requirement of improved high yielding varieties of oilseeds, especially sesame. This is quite understandable as we have found earlier that productivity of sesame if quite low as compared to its competitive/complementary crops like summer paddy. The second strongly suggested factor is that the farmers wish to get themselves trained in workshops arranged by state agriculture departments. No doubt, this is quite appreciable as it reflects farmers' inclination towards adopting modern farming techniques given appropriate training and support. This suggestion, according to importance is followed by the factor which is linked to availability of labour in the agricultural labour market. A large number of farms complained about unavailability of agricultural labour during sowing and harvesting, which hamper normal farming time-schedule.

The other suggested measures according to their importance assigned by the farmers include suggestion on account of necessity of regulated markets (58.8 percent), soil testing and proper application of fertilizers (47.2 percent) and use of modern farm equipments (42.0 percent). Only about 20.4 percent of the farms have suggested for the requirement of organic fertilizers at low prices.

Table 4.10: Suggestions for improving production and productivity of oilseeds *(%)*

Suggestion	Marginal	Small	Medium	Large	All Farms
1. Requires Improved HYV seeds	98.79	95.35	71.43	-	93.60
2. Applying chemical fertilizer after testing the soil quality	43.03	46.51	64.29	-	47.20
3. Using modern farm related equipments like- Combined Harvester	36.36	44.19	61.90	-	42.00
4. Arrangement of workshop on oilseeds by the Agricultural Department	74.55	67.44	92.86	-	76.40
5. Adequate irrigation facility is required	1.82	9.30	2.38	-	3.20
6. Sufficiency of hired labour	64.85	60.47	66.67	-	64.40
7. Necessity of regulated market	56.97	53.49	35.71	-	52.80
8. Requires organic fertilizer at low price rate	23.64	23.26	4.76	-	20.40

Source: Field Survey

The least suggested measure relates to adequacy of irrigation facility, as most of the farms (96.8 percent) perceive existing irrigation facilities adequate for the cultivation of sesame. It should be noted here that cultivation of sesame in the study region in general does not call for assured irrigation as a precondition to sesame production, as it demand much less irrigation even in the dry summer season as compared to its competitive/complementary crops.

5

Summary of Findings, Concluding Observations and Policy Suggestions

5.1: SUMMARY OF FINDINGS

Backdrop of the Study

On the oilseeds map of the world, India occupies a prominent position, both in regard to acreage and production. India contributes about 10 percent of the world oilseeds production, 6-7% of the global production of vegetable oil and protein meal and is the 4th largest edible oil economy in the world. This sector has also an important position in the India agricultural sector covering an area of about 26.8 million hectares, with total production of about 27.9million tones in Triennium Ending(Te) 2010-11(GOI,2011).This constitutes about 14.9 percent of the gross cropped area in the country. The oilseeds accounted for about 9.7 percent (at 2004-05 prices) of the total value of output from agriculture in TE 2009-10 (CSO 2011).

Role of Agriculture in the State

West Bengal happens to be the 3rd biggest economy in India. The main contributing factor in economy and business of this Indian state is agriculture and it is the main occupation of the people of West Bengal. In the year 2009 and 2010 agriculture sector contributed a total of 18.7 percent to the state's total GDP. The cropping pattern of this state is dominated by food crops which account for about 78 per cent of the area under principal crops. Rice is cultivated in 58.48 lakh hectares (production of 161.48 lakh MT) followed by Cereals (all combined) in 63.49 lakh hectares and oilseeds in 7.14 lakh hectares, Jute in 6.09 lakh hectares and potato in 3.67 lakh hectares. The state is second largest producer of Potato after Uttar Pradesh and one of the highest producers of vegetable in the country. Traditionally, West Bengal has been the highest producer of jute. The State also accounts for 25 per cent of tea production in the country, next only to Assam. Against the ultimate irrigation potential of 67.43 lakh hectares, the gross irrigation potential created through major, medium and minor irrigation in the State till the end of March 2009 was 55.01 lakh hectares. The percentage utilization of potential created is 81.73 percent in major and medium irrigation structures and 81.64 percent in minor irrigation.

Importance of Oilseeds in the State Agriculture

In West Bengal, the share of cereals declined over the years, while those of fruits & vegetables increased from their 1980-81 levels. In particular, the share of cereals decreased from 52.76% in 1980-81 to 32.82% in 2005-06, while the share of fruits & vegetables registered a massive increase from 17.74% in 1980-81 to 44.84% in 2005-06. The share of condiments & spices showed marginal increase from 0.92% in 1980-81 to 2.07% in 2005-06, while pulses, sugarcane and fibre showed marginal decline. The share of oilseeds fluctuated over the years, and somehow succeeded to retain its relative importance more or less same over time.

Problems in Oilseeds Production

West Bengal does not occupy any significant position in terms of either acreage or production of oilseeds. In terms of both acreage and production rape and mustard are by far the most important oilseed crops both in terms of area and production. Sesame and linseeds are the other two oilseed crops raised in this state.

A brief review of literature regarding the performance of oilseeds yield and production reveals that a number of factors can be held responsible for the poor performance of the oilseeds sector in the state. These may be put as-

g) Shortage of HYV seeds,

h) Lack of use of irrigation, fertilizer and pesticide in appropriate doses,

i) High risk and uncertainty factors in production

j) Tendency to raise pulses mixed with other crops

k) Poor managerial attention, and

l) Inadequately of extension facilities.

Objectives of the Study

The specific objectives of the study are:

3. To examine trends and pattern of growth of different edible oilseeds over time and across states/districts and identify the sources of growth in edible oilseeds output in India/ state;
4. To determine the impact of price and non-price factors influencing the supply response behavior and demand for edible oilseeds and oils in the country/state; and
5. To identify major constraints in the edible oilseed and palm cultivation and suggest policy options to increase oilseeds production and productivity in the country.

Coverage and Sampling Design

The study is based on both primary and secondary data pertaining to edible oilseeds. In order to meet the first two objectives of the study a substantial amount of collection and analysis of secondary data related to area, production and productivity of oilseeds is undertaken. In order to identify major constraints in edible oilseeds production in the country, primary data from households growing oilseeds is collected and analyzed.

A multistage, purposive sampling method is used to select the districts, blocks and farm households based on acreage & yield rate as has been depicted in the following table 2.1.1. At first stage, one district each from high acreage & high yield districts, high acreage & low yield districts, and low acreage & high yield districts have been selected. Since HH,HL and LH districts have potential for increasing production of oilseeds; we have selected at least one district each from these 3 categories for household survey. The 3 selected districts are Nadia, Bankura and North 24 Parganas respectively.

At second stage, major oilseeds producing blocks is selected and an appropriate number of villages is selected for household survey. From each selected village an appropriate number of farmers representing different farm categories (Marginal 0-1 ha, Small 1-2 ha, Semi-medium 2-4 ha, and Medium 4-10 ha) based on probability proportional to size in each district, such that we get a minimum of 20 households in each category in the final sample pool. However, we finally club the semi-medium category with medium category, and treat the clubbed category as 'medium' category. In way, a total number of 250 sample households have been selected for the study distributed over different size-categories in selected districts, as shown here in table 2.1.2.

Cropping Pattern Changes in the State

After the introduction of the high yielding varieties of seeds and other land augmenting technologies, agriculture in West Bengal has witnessed remarkable changes over time. This has particularly influenced the cropping pattern of the state at large, bringing about increase in acreage of certain crops and decline in particular cases also. It is to be noted here that the impact of Green Revolution spread across West Bengal with a time-lag of one or two decades, as compared to western states like Punjab, Haryana, etc. This is reflected in a rapid in crease in the acreage of certain crops in the 1970s and 1980s. During the last four decades, acreage under foodgrains hardly increased. On the part of the oilseeds, it is quite inspiring to observe that area under oilseeds (especially mustard) registered a sharp increase over time. In particular, while proportional allocation of land under rapeseed and mustard increased from 1.70 percent during TE 1973-74 to 5.80 percent during TE 2009-10, that for other oilseeds (including sesame) increased from 1.10 percent to 4.00 percent over the same period of time. As a result of these changes, proportional acreage allocation (as percent of gross cropped area) under oilseeds registered a sharp increase from 1.10 percent in TE 1973-74 to 9.80 percent in TE 2009-10. As such, it comes out that over the last few

decades, while cultivation of foodgrains lost its importance to some extent, cultivation of oilseeds has gained significance in the cropping pattern in West Bengal agriculture.

Factors Underlying Changes in Cropping Pattern

The changes in cropping pattern over the last few decades in the state resulted from situational advantage or disadvantage for specific crops to grow in acreage and yield rate. This was actively backed by several government schemes to promote specific crops like HYV rice or newer breeds of oilseeds over definite time periods. Though with a sufficient time-lag, the results are clearly reflected in the changes that took place in the cropping pattern of the state.

Growth Trends in Area, Production and Yield of Major Oilseeds

Among the major changes that took place in the cropping pattern of West Bengal agriculture, growth of oilseeds sector is no doubt a significant change. Data on area, production and yield rate of oilseeds in the state clearly reflects the growth trajectory of oilseeds sector over the last five decades, thanks to various government schemes and favourable condition for the growth of the sector. In fact, area, production and yield rate of oilseeds exhibited a continuous growth over the last five decades, viz. since the 1960s. There has been a quantum jump especially in the area and production of oilseeds during the 1970s. During this decade area under oilseeds more than doubled itself, while production grew by nearly four times. This has been especially due to a rapid increase in area under rapeseed and mustard in the state. In the later decades, viz., during the 1980s, oilseeds sector grew further, but at a slower rate as compared to the earlier decade. Since the 1990s, however, the growth in the oilseeds sector can largely be attributed to oilseeds like sesame, sunflower, groundnut, etc. But the fact remains that oilseeds sector in West Bengal have witnessed a consistent growth in area, production as well as yield rate throughout the last fifty years. This is especially impressive considering a corresponding slowdown in the foodgrains sector in the state, especially since the 1990s.

Variability in Area, Production and Yield of Sesame

Though in West Bengal mustard has been the major oilseed thought the last few decades, but very recently (especially since the 1990s) there has been a slowdown in the growth of mustard while sesame is fast coming up as a major oilseed in the state. In fact, growth in area, production and yield rate of sesame has been quite impressive throughout the decades. Over the last four decades, area under sesame grew by more than four times from 40.46 thousand hectares during the 1970s to 162.46 thousand hectares during the last decade 2000s. Production of sesame on the other hand grew even sharper from 21.82 thousand tonnes in 1970s to as high as 138.02 thousand tonnes during 2000s, thanks to increasing trend in the yield rate from 554 kg/ha to 851 kg/ha over the same period of time. All

these in turn have placed sesame as a major oilseed crop in the state commanding over 28 percent area under oilseeds. From our earlier analysis, it is also observed that along with the major oilseed producing districts, sesame (or sesame) has grown in areas which are not traditionally known as oilseed producing districts, and has come up as a situational solution to farming in summer under non-availability or poor availability of irrigation conditions.

Variability in the Growth of Area, Production and Yield of Sesame

To examine the variability in the growth of area, production and productivity of oilseeds (particularly sesame) across districts of the state, we classify districts according to the direction and magnitude (level of significance) of growth achieved during specific time periods. During the period 1981-82 to 2009-10, it can be observed that as many as 6 districts in the state have witnessed significant positive growth in area under sesame. These districts include Nadia, Midnapore (E & W), Murshidabad, 24 Parganas (North & South), Bankura and Hooghly. In contrast, a number of districts have experienced significant negative growth in area under sesame, which include districts like Malda, Dinajpur (North & South), Darjeeling, Birbhum, Howrah, Coochbehar and Purulia. At the same time, some districts have exhibited negative stagnant growth in area under sesame, which include districts like Burdwan and Jalpaiguri, while none of districts has experienced a positive stagnant growth.

Main Features of Sample Households: Land Ownership Pattern, Cropping Pattern, etc.

In case of socio-economic status of the sample households, it is observed that primary occupation of an overwhelming majority of respondents is agriculture. The farm families are mostly from Other Backward Classes and male dominated in nature, where average age of the heads is about 47 years. Average level of education (12.73) and family size (about 6 persons per family) tends to increase with increase in farm-size.

The pattern of land ownership by the sample households reveal that the average size of operational holding stands at 1.23 hectares, which gets irrigation from various sources. Only parts of owned land remains un-irrigated, which is left fallow as well. On the whole, data reveals that area covered under the present survey largely remains irrigated with little fallow land to waste. The incidence of leasing-in of land is much higher for the smaller farms, especially the marginal farms (17.2 percent) as compared to the medium farms (0.40 percent). Furthermore, an overwhelming majority (93.75 percent) of these lease contracts/arrangements are carried out on fixed rent in cash. The major source of irrigation is found to be groundwater sources.

The principal crops of the study region are kharif paddy, followed by summer paddy and wheat among the cereals. Among the non-cereal crops, a large area under cultivation is devoted to mustard, followed by sesame and sunflower. The

principal oilseed crop comes out to be mustard. It is observed that yield rate of kharif paddy stands at 53.32 quintals per hectare, and that for boro (summer) paddy stands at 48.67 quintals per hectare. In case of kharif paddy, average yield rate shows a sharp increase over increase in size, though such pattern is not observed in case of summer paddy. However, average yield of wheat stands at 26.11 quintals per hectare, which too shows a direct relationship with farm size. In case of yield rate of oilseeds, it is observed that average yield rate for mustard stands at 10.80 quintals per hectare, while that for sesame stands at 11.36 quintals per hectare.

Production, Retention and Sale of Rabi Oilseed I (Mustard)

In case of production of mustard, it is observed that average production of mustard steadily increases with increase in farm-size, which is quite obvious under the present circumstances. However, in case of retention, it is observed that a progressively lower proportion of mustard produced is retained back, while a progressive higher proportion of mustard is marketed over increase in farm-size. This in turn indicates that as farm size increase, retention for family consumption also increases but at a proportionately lower rate than marketed surplus.

Production, Retention and Sale of Rabi Oilseed II (Sunflower)

In case of production of sunflower, similar trends may be observed as in case of mustard, but at a lower magnitude. In particular, average production of sunflower shows an increasing trend over increase in farm-size. Retention and marketed surplus of sunflower also tends to increase with increase in farm size, but that increase is proportionate much sharper in case of marketed surplus of sunflower than its retention.

Production, Retention and Sale of Summer Oilseed I (Sesame)

In case of production, retention and sale of summer oilseed, viz. sesame, we also witness likewise pattern as mustard and sunflower. In particular, average production and average marketed surplus shows an increasing pattern with increase in farm size. However, in case of retention such a pattern is not well established. Also, average prices fetched per quintal of sesame remains the highest for the small farms, followed by the medium and the marginal farms.

Profitability of Major Oilseeds and Competing Crops

In case of profitability in cultivation of oilseeds (here, sesame), the results of our field investigation shows that though costs of production per unit of land is much less for sesame cultivation as compared to competing crop (summer paddy), profitability of sesame cultivation is much lower. In particular, profitability in sesame cultivation stands out to be as low as 1/3rd of that in cultivation of

summer paddy. Even though costs on account of seeds, fertilizers, insecticides & pesticides, etc. are much lower for sesame cultivation as compared to cultivation of summer paddy, lower gross value of output per unit of land in sesame cultivation in turn brings down profit.

Profitability vis-à-vis Risks in Oilseeds production

In terms of risks involved, cultivation of oilseeds appears much riskier as compared to cultivation of summer paddy. This has been true in respect of risks involved in yield, price of output as well as net income from cultivation of oilseeds, especially for the smaller farms. Variability in yield is also higher in case of oilseeds cultivation, which too is more pronounced for the smaller farms, though at the aggregative level yield variability in oilseeds cultivation is lower than that in cultivation of summer paddy.

Access to Improved Technology and Markets for Oilseeds

With regard to access to technology in oilseeds cultivation, the survey finds that all the sample farms belonging to all size-classes use high yielding varieties of seeds. This in turn shows acceptance of modern technology among the farms in terms of use of HYV seeds. However, a majority of the farms have been found using seeds obtained from various sources, while about 38.8 percent of farms purchase seeds directly from the market, especially the larger farms.

Yield Gap Analysis

It is interestingly observed that actual farm yield is higher than both experimental yield (in demonstration plots of department of agriculture, government of West Bengal) and potential yield. This holds true consistently for all the size-classes.

Perceived Constraints in Cultivation of Oilseed Crops

There are practically numerous constraints in the cultivation of oilseeds in the study region. It is practically not feasible to address each of them, but a few of them is highlighted here. Among the technological constrained as perceived by the farmers, it is observed that the major bottlenecks are poor crop germination (96.3 percent), followed by non-availability of suitable varieties of sesame (88.5 percent). Considering various agro-climatic factors acting as constraints in sesame cultivation, it is observed the on the one extreme, drought at critical stages of crop growth (91.2 percent) and excessive rains (91 percent) on the other extreme. Among the various economic constraints, a few important ones are low and fluctuating prices (92.5 percent), high input costs (80.1 percent) and shortage of human labour (80.6 percent). Among the institutional bottlenecks, the problem of timely availability of seeds stands out as the single major bottleneck in the cultivation of sesame, as perceived by 90.9 percent of the respondents. Lastly,

among the constraints faced in the post-harvest period, the single major bottleneck appears to be exploitation by market intermediaries as perceived by as high as 98.4 percent of the respondent farmers.

Marketing Pattern of Oilseeds

Marketing of oilseeds (sesame) mostly occurs in a personalized manner where a major part of the output is sold to the processing mills (46.89 percent), followed by the local village traders (36.24 percent) and the commission agents (16.89 percent). However, there are variations in preference for particular marketing agencies among different size-class of farms. It comes out that while the smaller farms prefer to market their product to local village traders, majority of the larger farms sell their product to processing units.

Sources of Technology and Market Information

The technical know-how about variety of seeds to be used is largely obtained from two major sources, viz. State Department of Agriculture (40.8 percent) and Retail Market (38.8 percent). Apart from farmers using of homestead seeds (14.4 percent), only about 6.0 percent of farmers obtain information about seeds from fellow farmers. While considering extension services, it has been observed that State Department of Agriculture is the only extension service provider for all the sample farms. No other agencies like state agriculture universities, Krishi Vigyan Kendras, etc. have provided extension services to the farmers regarding sesame cultivation.

Suggestions for Improving production and Productivity of Oilseeds

Among the suggestions forwarded by the sample farms for improving production and productivity of oilseeds (sesame), the most strongly suggested factor is the requirement of improved high yielding varieties of oilseeds, especially sesame. The other suggested measures according to their importance assigned by the farmers include suggestion on account of necessity of regulated markets (58.8 percent), soil testing and proper application of fertilizers (47.2 percent) and use of modern farm equipments (42.0 percent).

5.3: CONCLUDING OBSERVATIONS

Based on the major findings of the present study, a number of important concluding observations can be made. However, we may highlight some of these observations as follows:

Analysis of secondary data on area, production and productivity of oilseeds over the decades reveal that while there has been a slowdown in the foodgrains sector in West Bengal agriculture, oilseeds sector in the state has experienced a remarkable development in terms of area, production as well as productivity. Though there has been a shift in the importance of specific crops in the composition of oilseeds sector, the growth trajectory has remained intact over the decades. In particular, during the 1970s and partly in 1980s, spread of cultivation of mustard acted as the engine of growth in the oilseeds sector in West Bengal. However, over time, especially since the 1990s, situation turned in favour of cultivation of sesame. A number of districts which are not traditionally known as oilseed producing district came up as important contributors to state's oilseed map. At present, while growth of area, production and productivity of mustard has slowed down, that of sesame has picked up momentum and fast becoming a major crop in the oilseeds sector in state agriculture.

This impressive growth in the oilseeds sector led by spread of cultivation of sesame has its root planted in some of the situational and economic advantages in West Bengal agriculture, as has been observed from an empirical investigation carried out for this study. In particular, it is observed that as spread of irrigation facilities came to a halt, sesame appeared as a major crop to take advantage of the situation. It is observed that cultivation of sesame requires much less irrigation and operational cost. Though it involves many risks in terms of yield and price, cultivation of sesame complemented cultivation of summer paddy to a large extent. In particular, sesame is observed to be cultivated in plots that would have been left fallow otherwise. This is particularly why after so much risks and low yield rate, sesame is fast becoming a major crop in the oilseed map of West Bengal.

Further, it is impressive to note that cultivation of sesame has made a remarkable progress even after confronting a number of technological, economic and infrastructural constraints. It thus comes out that to further promote growth in the cultivation of oilseeds, such constraints need to be addressed in future intervention schemes, particularly relating to price risks and economic uncertainties. Such efforts are expected to place cultivation of sesame in West Bengal on a self-sustained growth path.

5.3: POLICY SUGGESTIONS

Based on the observations of the present study, a few policy suggestions can be made, which are briefly stated as below:

- There is ample opportunity for the development of sesame cultivation, particularly in the rain-fed areas in West Bengal. As such, targeted efforts should be made to promote sesame cultivation in semi-arid/rain-fed conditions. [Attention: Department of Agriculture, Government of India; Department of Agriculture, Government of West Bengal]
- It is observed that the specific variety of sesame cultivated in West Bengal dates back to 1973. However, situation in agriculture has changed much since then. Under modern cultivation practices, newer improved varieties of sesame seeds (especially the drought-resistant ones) need to be introduced. [Attention: Inputs Division, Department of Agriculture, Government of West Bengal]
- Efforts should be made to regularize rural oilseed market, particularly to free the market from the clutches of intermediaries like village-level petty traders. This, one on the hand, assures remunerative prices to the actual producer, one the other allows free play of the markets. [Attention: Department of Marketing; Government of West Bengal]
- The government should step-up its efforts to impart scientific knowledge to the farmers to help augment growth in sesame cultivation through various training programmes conducted by State Agriculture Universities, State Department of Agriculture, etc. [Attention: Department of Agriculture, Government of West Bengal]
- It was observed that on-farm experiments on sesame cultivation in state agriculture farms often date back years. Often actual yield rate on farmers' plots have been exceeding yield rate of experimental plots of agriculture farms. As such, the state agriculture farms should regularly experiment with sesame cultivation and set examples of scientific cultivation techniques with high yield rates. [Attention: Department of Agriculture; Government of West Bengal]
- In an attempt to promote dynamic outlook of the farmers toward adoption of modern cultivation practices, there is a felt need to further promote farmers' awareness regarding various government schemes and policies. [Attention: Department of Agriculture, Government of India]

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COMMENTS ON THE DRAFT REPORT

Review Report

1. Title of the Draft Study Report Examined:
Problems and Prospects of Oilseeds Production in West Bengal

2. Date of Receipt of the Draft Report:
March 5, 2013

3. Date of Dispatch of Comments:
May 17, 2013

4. Comments on the Objectives of the study:
The objectives of the study are quite comprehensive and address major issues related to problems in oilseeds production in the State. The study specifically studies trends and pattern of growth of different edible oilseeds over time and across districts and identify the sources of growth in edible oilseeds output in the state; examines the impact of price and non-price factors influencing the supply response behavior and demand for edible oilseeds and oils in the state; and identifies major constraints in the edible oilseed and palm cultivation and suggest policy options to increase oilseeds production and productivity in the State.

5. Comments on the Methodology:
Appropriate sampling technique has been used by the author for selection of district(s), blocks, villages and sample households. The study is based on both primary and secondary data. The study uses simple analytical tools like averages, percentages, growth rates, coefficient of variation, etc.

6. Comments on the Presentation, Get up etc.:
After a brief backdrop of the study and state in Chapter 1, second chapter presents technical aspects like coverage of the study and methodology followed with a brief description of the study area. Chapter 3 presents overview of the oilseeds sector in the State and analyzes its current status and growth behaviour over time using secondary information. In the 4th chapter, analysis of problems and prospects of oilseed production through an empirical investigation at the farm household level is presented nicely. The last chapter highlights the major findings of the study and draws concluding observations and states their policy implications.
The report is nicely presented but there are some editorial/grammatical errors in the text, which need to be taken care of while finalizing it.
The 2nd objective of the study has not been covered in the report, so it is suggested that either it should be removed from the objectives (page 9) or analysis should be carried out to examine impact of various factors on supply response behavior/demand for oilseeds/oils in the state. The yield gap analysis (page 50) shows that actual farm yield is much higher than experimental/potential farm yield, which needs justification and supporting evidence. It may be useful to compute composite index of constraints to get an idea about relative importance of various constraints in cultivation of oilseed crops in the State and make useful recommendations.

Overall View on Acceptability of the Report:
The report may be accepted for publication and authors may wish to address some of the points suggested above.

Sd/-
(Vijay Paul Sharma)
Indian Institute of Management,
Ahmedabad

ACTION TAKEN REPORT

1. Title of the Finalized Study Report:

Problems and Prospects of Oilseeds Production in West Bengal

2. Date of Receipt of the Comments on Draft Report:

May 17, 2013

3. Date of Dispatch of Final Report:

May 18, 2013

4. Specific Actions taken:

a) Editorial/grammatical errors in the text have been corrected.

b) The 2nd objective of the draft study report has indeed not been addresses in the report, and hence is removed from the objectives (page 8, 9);

c) In the yield gap analysis (page 50), actual farm yield is indeed much higher than experimental/potential farm yield. Justification in favour of such a result has been presented in the 3rd paragraph in the same page;

d) The table 4.7 (page 51) in fact depicts a composite index of constraints to get an idea about relative importance of various constraints in cultivation of oilseed crops.

Sd/-

(S Chakrabarti)

Hony. Director

A.E.R.C., Visva-Bharati