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Commodity Specific Study - Groundnut

पण्य विशिष्ट अध्ययन - मूंगफली



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25 Years of Invigorating the Rural Economy

FOREWORD

Eversince the country adopted policies of market liberalisation, globalisation and expansion of agri-business, there had been a concern that majority of its farmers are still in subsistence farming and may find it difficult to participate in the emerging competition. Effective level-playing competition in the international market for majority of the Indian farmers appears to be a distant possibility due to small farm size and inadequate infrastructure to take care of the required quality standards. Thus, there is a need for evolving an appropriate system/model, which can ensure supply of reliable and cost-efficient agri-inputs, farm extension services and the guaranteed market to the farmers.

The economic importance of cash crops particularly groundnut in the oilseed sector in the context of shortage of productions under edible oil resulting large-scale imports needs no elaboration. However, a number of issues need to be addressed including low level of productivity and inadequate infrastructure for post-harvest technology. In this backdrop, a detailed study was undertaken to draw suitable policy feedback in an attempt to remove the constraints faced by the oilseed sector.

The present report, third in a series of evaluation studies conducted by NABARD, Chhattisgarh Regional Office, is based on a study in Sarguja district of Chhattisgarh State. The study, in addition to working out the economics of groundnut cultivation, has sought to address a number of issues faced by the farmers, such as processing, marketing, etc. The report also covers various emerging segments in the sector, such as post-harvest technology, export competitiveness as well as the scope of contract farming in the sector.

The study findings, inter alia, suggest that farmers are confronted with problems such as supply of inputs, non-availability of genuine seeds, inadequate extension services, confusion over cropping pattern, ineffective risk mitigation mechanism, lack of awareness on product quality, etc. on the marketing front. The study illustrates the non-functioning of marketing societies/ committees, lack of uniformity in market fees, high level of product contamination, inadequate infrastructure, especially for packing, storing, etc.

I hope that the findings of the study will provide valuable insights into groundnut sector in this State and throw up signals to the policy makers, academic institutions and other agencies involved in framing the future policies.

Raipur

S.K. Chatterjee  
Chief General Manager

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The views expressed in the study report are of the author alone.

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## Executive Summary

- In chhattisgarh, the area sown more than once is only 16.2 lakh ha. out of total net sown area of 47.7 lakh ha. with cropping intensity 134% which is below the national average. Apart from paddy, other cereals (maize, kado-kutki, small millets), pulses (red gram, black gram), there are very few cash crops grown in chhattisgarh, i.e. groundnut, soyabean and sugarcane are grown in a few pockets of the state (limited to 1-2 districts). Groundnut cultivation is being undertaken in a limited area in the state, i.e. 0.58 lakh ha. in Kharif and 0.09 lakh ha. in Rabi constituting 1.2 % and 0.2% respectively of the net sown area. The groundnut cultivation is concentrated in a few blocks of Sarguja and Raigarh districts depending upon the suitability of agro-climatic conditions and soil types. The main blocks in which groundnut cultivation are being undertaken includes Surajpur, Sitapur, Ambikapur and Baikunthpur (Sarguja district), and Dharmjaygarh (Raigarh district).
- This study was undertaken with special focus on identification of the critical factors conducive or otherwise for the promotion of cash crop like groundnut in consonance with objective of post harvest management. With a broad objective of efficiency in supply chain management of groundnut as a commodity, the specific objectives of the study were the following:-
  - i. To study Spatial and temporal analysis of area, production, yield and price to ascertain the extent of integration of markets,
  - ii. To address the constraints/issues in production at farm level in terms of input availability, extension, availability of infrastructure for Post Harvest Management etc.,
  - iii. To study the practices followed in respect of Grading/ Processing / Packing, Value Addition, etc.,
  - iv. To study the pattern of supply of inputs and technology to the farmers and
  - v. To understand Marketing aspects, Credit aspects and Export aspects
- The study was based on a sample of 30 farmers, 2 processors, 6 traders/wholesalers/commission agents. The data on cultivation, marketing and processing were collected for the reference year 2005-06.
- The compounded annual average growth rate of productivity during 200-01 and 2005-06 showed positive growth (0.51%) though at a slowed pace. The growth in production is

contributed more by area expansion (90.66%) than by groundnut yield (9.34%).

- Groundnut cultivation in Sarguja District is concentrated in four blocks viz., Ambikapur, Sitapur, Surajpur and Baikunthpur. These blocks collectively contributed in the range of 70-72 per cent of the total production of Sarguja district during last 5 year period. Around 64 to 70 per cent area under groundnut in Sarguja district is shared by these 4 blocks. However, there is a wide fluctuation in the share of area and production of major producing blocks in Sarguja district during the period from 2001-02 to 2005-06.
- Another promising cropping sequence has been observed during field visit that rice-groundnut sequence has gained more importance than the rice-rice rotation because of frequent shortage of water supply for rice cultivation in command area alongwith the concept that groundnut does well if planted after cereal crops.
- The age of farmers ranged from 23 to 59 years with an average of 36 years indicating that majority of the farmers belonged to higher age group.
- 50% of the sample farmers belonged to the general castes followed by Scheduled Tribes/ Scheduled Castes (27%) and OBC (23%) of the total sample.
- The majority of the sample farmers (80%) were illiterate. Further, only 3% of the farmers had education of secondary level and above.
- Average size of operational holdings of sample farmers was 6.24 acres which didn't show much variation across the blocks. 23% of the sample farmers belonged to the category of small and marginal farmers.
- The proportion of irrigated area in net sown area was 46.00% for the sample as a whole and ranged from 36.36% in Baikunthpur to 53.85% in Surajpur block.
- The area allocated to groundnut cultivation was 30.56% of the 'gross cropped area' for the sample as a whole and ranged from 25.57% in Baikunthpur block to 35.71% in Sitapur block.
- The farmers who had borrowed from institutional sources were 63.34% for crop loans, 23.33% for investment loans and

13.33% for both purposes. The coverage of KCC was significant as 19 out of 30 farmers in the light of 100% coverage under KCC.

- The cost of cultivation of groundnut worked out to Rs.4950 per acre and it ranged from Rs.4675/-(Baikunthpur) to Rs.5265/-(Surajpur) per acre. Major portion of the cost was for labour (33.84%) followed by fertilisers (29.29%), seed (13.64%), pesticides (9.60%), land preparation (7.07%), and irrigation (6.57%). The average cost of cultivation of Rs.4950 was lower than the scale of finance fixed for the crop at Rs.7500/- per acre.
- The yield was as low as 16 quintals per acre in few cases (13.33%) and the average yield worked out to 20 quintals per acre for the entire sample.
- Price of wet groundnut is decided by the traders giving very little scope for farmers to influence the price. It ranges from Rs.12/- per kg in Kharif season and Rs.15/- per kg in Rabi season. Price spread ranged from Rs.12/- to Rs.22/- per kg (Farmers - Rs. 12/-, Trader - Rs. 14/-, wholesaler - Rs. 16/-, consumer Rs. 22/- and final product (salty nut Rs. 80/- per Kg. ). Majority of the traders/wholesalers are from Garwaha and Patna (Bihar) due to close proximity of these places from Sarguja District.
- Gross income from cultivation of groundnut ranged from Rs. 15000/- to Rs. 21000/- per acre with an average of Rs.18000/-.
- Net income per acre of groundnut ranged from Rs. 6000/- per acre to Rs. 10000/- per are with an average of Rs. 7500/-. The average income groundnut cultivation was higher than the average income from other major crop i.e. paddy. The income-earning potential of groundnut cultivation is discernible from the fact that occupying about 30.56% of the GCA, the crop is able to generate 32.48% of the farm family income.
- Groundnut cultivation is a labour intensive activity and generates a recurring employment of 120 person days on an average per acre per crop compared to other high value crops.
- Market arrivals in Ambikapur mandi are distributed as follows: 38-40 percent October to December, 28-30 percent January to March, 23-25 percent April to June, and 10-12 percent July to September. Accordingly, a month-end wholesale price of

groundnut (pod) varies from Rs 1450/ to Rs. 1760/- per quintal as per quantum of arrival in a particular month.

- About 70 to 80 per cent of the marketable surplus of groundnut pods is taken by the farmers personally to the markets in the study area.
- The 'Hand Picked Selection'(HPS) has to be treated as a high value crop to be grown in identified areas under high inputs and assured moisture. Considering the fact that India is one of the largest producers of groundnuts in the world and current export figures, India has a much larger potential to supply high quality groundnuts to the international buyer.
- On an average, India produces 8-9 million tonnes of groundnuts (unshelled) every year. The awareness and concern for quality amongst the Indian groundnut shellers and processors are growing steadily. Multiple sorting and grading are fast becoming a norm. Indian shippers have the capability to prepare and supply edible peanuts conforming to highest standards.
- Our export both in terms of volume and its share in the production has shown increasing trend. The major constraints in export of groundnut are largely on account of stiff competition in the international market. Our future production strategies should aim at emerging market preferences, product diversification, value addition, assured quality, introduction of new varieties in rain-fed condition and minimising the intermediators both in the supply and market chains.
- Further, groundnut as a major oilseeds and Its Importance in Indian Economy is as follows:
- Groundnut can withstand drought and is suitable for dry land farming, ii) It is a soil erosion resistant crop and being a legume crop, it can fix the atmospheric Nitrogen and thereby improve the soil fertility, iii) It provides a good green manure for succeeding crop, iv) Its shell, skin, hulk and hey are all good for fodder, v) Groundnut cake is chief oil-cake feed to animals and it is also used in manure and vi) The plant stalks are fed to cattle in the form of green, dried and silage.
- At the present level of demand and contribution of groundnut by 2020 AD, India will require about 14 million tonnes of groundnut. The present production level is around 9.7 million tonnes. Therefore, a gap of about 4.3 million tonnes has to be filled which calls for a growth rate of 2.2% per annum in the production. The growth has to come more from the increase in productivity and less from increase in area and irrigation potential. Some of the strategies which are likely to meet the

future requirements and raise the total production are i) Increase in area in traditional belt through crop diversification and increased cropping intensity.ii) Crop substitution i.e. Rainfed-upland rice by groundnut and iii) Use of organic mulch for better management of high and low temperature and conservation of soil moisture.

- Banks were charging 9 per cent on the crop loan given to sample farmers for purchase of inputs and fertilizers both in cash and in kind in case of cooperative banks(Kharif ; Total - Rs. 7500, cash - Rs. 3000, kind - Rs. 4500) (Rabi ; Total Rs. 5500/- ,cash - 2500, kind - 3000) and in cash in case of other banks(RRBs & CBs)
- Insurance products under Rashtriya Krishi Bima Yojana(RKBY) may have to be implemented for income risk in case of groundnut farmers.
- Banks may consider micro-irrigation system and fencing as major components for extending investment credit along with extending KCC to take care of higher production and productivity.
- Using Farmers' Clubs for propagating the message of contract farming would help both the companies as well as the farmers who are willing to take recourse to contract farming. This will also ensure linking of these farmers with bank branches for their credit needs.

## Chapter-1

### Introduction

Groundnut is grown on a large scale in almost all the tropical and subtropical countries of the world. The most important groundnut growing countries are India, China, Nigeria, Sudan and USA. It is grown over an area of 26.4 million hectares with a total production of 36.1 million tonnes and an average productivity of 1.6 metric tons per ha in whole world<sup>1</sup>. India occupies the third place in regard to acreage and in production. Groundnut (*Arachis hypogaea* L.) is the major oilseed crop in India accounting for 45% of oilseed area and 55% of oilseed production in the country. Now India along with china accounts for half of the world's groundnut production.

In India, groundnut is grown over an area of 7.5 million hectares with total production of 9.3 million tones and an average productivity of 1.4 metric tons per ha. Its cultivation is mostly confined to the western and southern states, viz., Gujarat, Andhra Pradesh, Karnataka, Tamil Nadu and Maharashtra. 70% of the area and 75% of the production are concentrated in these five states. The other important states where it is grown are Madhya Pradesh, Rajasthan, Uttar Pradesh and Punjab.

Groundnut is essentially a tropical crop. It requires a long and warm growing season. The most favourable climatic conditions for groundnut are a well-distributed rainfall of at least 50 cm. during growing season, abundance of sunshine and relatively warm temperatures (25-28°C). Lower temperatures are not suitable for its proper development. During ripening period it requires about a month of warm and dry weather. Groundnut thrives best in well-drained sandy and sandy loam soils, as light soil helps in easy penetration of pegs and their development and also harvesting. Clay or heavy soils are not suitable for this crop, as they interfere in penetration of pegs and make harvesting difficult. Groundnut gives good yields in the soil with pH between 6.0-6.5.

Groundnut is raised mostly as a rain fed kharif crop, being sown from May to July, depending on the monsoon rains. In some areas or where the monsoon is delayed, it is sown as late as August or early September. As an irrigated crop it is grown between January and March and between May and July.

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<sup>1</sup> (FAO, 2005)

There are three types of varieties in groundnut, bunch types, spreading and semi-spreading types. The bunch types have light green foliage, comparatively broad leaflets and mature early. However, they are usually susceptible to tikka disease. The spreading types usually have dark green foliage with smaller leaflets. These are usually late in maturity. The semi-spreading varieties are intermediate between the bunch and the spreading types.

### Need for the Study

The importance of groundnut in the oilseed sector in the context of shortage of edible oils at present, large scale imports at the expense of huge foreign exchange and major role in bridging the vegetable oil gap in the country needs no elaboration. However, groundnut as oilseed crop is in a cross road in a changed economic and technological era, especially on account of globalisation process. Therefore, a comprehensive study on groundnut was necessary for identification of the critical factors conducive or otherwise for the promotion of cash crop like groundnut in consonance with objective of post harvest management. The study is also intended to make an in depth analysis of the trend in production conditions of the commodity, rigidities and inefficiencies connected with it in various facets like production, processing, marketing, storage, price and non-price factor related aspects. In the above backdrop, a commodity specific study was conducted by NABARD, Chhattisgarh RO to understand the ground realities of the groundnut sector in the Chhattisgarh context. The reference year for the study was 2005-06.

### Structure of the Report

The report has been presented in 6 chapters and 4 annexures. Objectives, study design and methodology adopted for the study have been presented in Chapter 2. Chapter 3 gives an overview of groundnut crop and its cultivation in Chhattisgarh. Economics of groundnut cultivation is presented in chapter 4. Chapter 5 presents processing and marketing aspects and Price spread and scope for export are dealt in chapter 6. Constraints faced by the groundnut sector alongwith study recommendations and suggestions are presented in Chapter 7.

## Scope of the Study

The findings of the study are based on a sample farmers cultivating groundnut on a limited scale compared to other major producing states. Therefore, the findings of the study presented in this report should be interpreted judiciously and cannot be generalised for other oilseed crops within and outside the State.

## Objectives

With a broad objective of efficiency in supply chain management of groundnut as a commodity, the specific objectives of the study were the following:-

- vi. To study Spatial and temporal analysis of area, production, yield and price to ascertain the extent of integration of markets,
- vii. To address the constraints/issues in production at farm level in terms of input availability, extension, availability of infrastructure for Post Harvest Management etc.,
- viii. To study the practices followed in respect of Grading/ Processing / Packing, Value Addition, etc.,
- ix. To study the pattern of supply of inputs and technology to the farmers and
- x. To understand Marketing aspects, Credit aspects and Export aspects

Sample Design and Methodology for the study are given in the APPENDIX.

## Chapter-2

## Groundnut Cultivation in Chhattisgarh

In chhattisgarh, the area sown more than once is only 16.2 lakh ha. out of total net sown area of 47.7 lakh ha. with cropping intensity 134% which is below the national average. Apart from paddy, other cereals (maize, kado-kutki, small millets), pulses (red gram, black gram), there are very few cash crops grown in chhattisgarh, i.e. groundnut, soyabean and sugarcane are grown in a few pockets of the state (limited to 1-2 districts). Groundnut cultivation is being undertaken in a limited area in the state, i.e. 0.58 lakh ha. in Kharif and 0.09 lakh ha. in Rabi constituting 1.2 % and 0.2% respectively of the net sown area. The groundnut cultivation is concentrated in a few blocks of Sarguja and Raigarh districts depending upon the suitability of agro-climatic conditions and soil types. The main blocks in which groundnut cultivation are being undertaken includes Surajpur, Sitapur, Ambikapur and Baikunthpur (Sarguja district), and Dharmjaygarh (Raigarh district).

Table 3.1 Area, Production and Productivity of Groundnut in major Districts of Chhattisgarh

(A = Area in Hectares, P = Production in tonnes & Y= Yield in Kg/ha)

	Sarguja			Raigarh			Chhattisgarh		
	A	P	Y	A	P	Y	A	P	Y
2001-02	12459	10640	854	4236	3442	675	16954	14442	708
2002-03	13254	11372	858	4506	3661	718	18036	15364	753
2003-04	14100	12295	872	4794	3895	764	19187	16344	801
2004-05	15000	13367	891	5100	4144	813	20412	17388	852
2005-06	15015	12943	862	5105	4012	786	20432	16836	824
Growth <sup>2</sup>	5.09	5.65	0.56	4.81	5.27	0.46	4.95(90.66)	5.46	0.51(9.34)

Source: Agriculture statistics & Review of Kharif and Rabi crops published by Agriculture Department, Govt. of Chhattisgarh. Various issues, Chhattisgarh State,

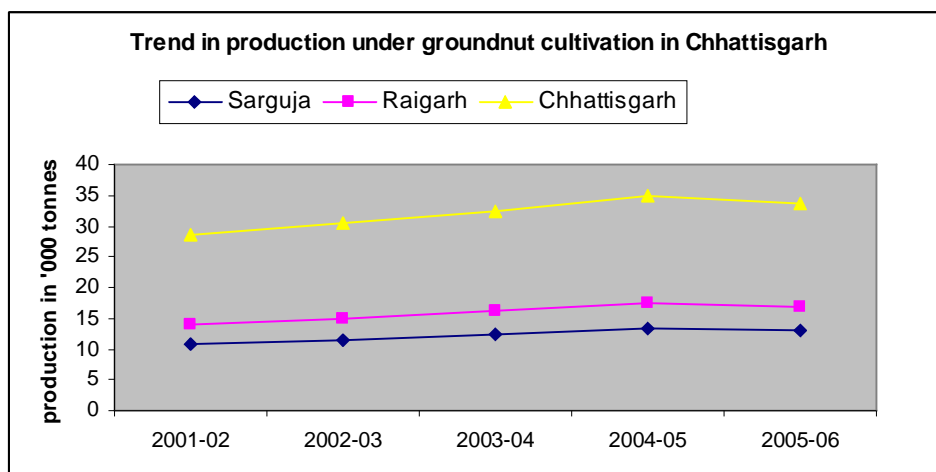
2.2 One of the significant features emerged from the data presented in table 3.1 is the increasing trend in area, productivity of groundnut in both the districts and in the State. The compound annual average growth rate of productivity during 2000-01 and 2005-06 showed positive growth (0.51%) though at a

<sup>2</sup> CAGR(%) during the period from 2001-02 to 2005-06

slowed pace. The growth in production is contributed more by area expansion (90.66%) than by yield (9.34%) enhancement.

2.3 There is a consistent increasing trend in the production level under groundnut both for the district and state level except for the year 2005-06 though there was increase in area during this period.(trend in production under groundnut is given in Chart 3.1)

Chart 3.1 Trends in Groundnut Production in Chhattisgarh



2.4 Before discussing the results of empirical estimation, an overview of the main variable viz., production is presented in Chart2.1. In both the districts and at the State level, production of groundnut crop registered an increasing trend during the period 2000-01 to 2004-05. Apparently, the slope of trend curve of production of Chhattisgarh State was steeper than the major producing districts viz., Sarguja and Raigarh District indicating that production of Chhattisgarh state as a whole increased at a faster rate compared to these two districts.

2.5 Groundnut cultivation in Sarguja District is concentrated in four blocks viz., Ambikapur, Sitapur, Surajpur and Baikunthpur. These blocks collectively contributed in the range of 70-72 per cent of the total production of Sarguja district during last 5 year period. Around 64 to 70 per cent area under groundnut in Sarguja district is shared by these 4 blocks. However, there is a wide fluctuation in the share of area and production of major producing blocks in Sarguja district during the period from 2001-

02 to 2005-06. Area under groundnut cultivation has increased marginally in three blocks whereas; acreages in Sitapur block have shown a declining trend during the period. This decline could be due to diversification of area towards another cash crop i.e. sugarcane.

**Table 2.2 Share of Area and Production of Groundnut in Major Groundnut growing blocks of Sarguja District  
(Area & Production in % to total)**

Block	2001-02		2002-03		2003-04		2004-05		2005-06	
	A	P	A	P	A	P	A	P	A	P
Ambikapur	14.1	16.8	14.1	16.6	14.5	15.6	14.7	15.01	15.0	14.7
Sitapur	23.3	21.7	21.8	20.7	20.1	21.7	21.1	21.7	13.8	21.5
Surajpur	15.7	17.2	16.9	16.4	17.1	17.4	17.4	17.8	17.6	18.3
Baikunthpur	14.4	16.2	16.0	16.9	17.1	17.8	17.6	18.0	17.7	18.1
Sarguja(Total)	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Source: Review of Kharif and Rabi crops published by District Agriculture Department Various issues

2.6 Another promising cropping sequence has been observed during field visit that rice-groundnut sequence has gained more importance than the rice-rice rotation because of frequent shortage of water supply for rice cultivation in command area alongwith the concept that groundnut does well if planted after cereal crops.

## Chapter-3

## Economics of Groundnut Cultivation

The cost of cultivation, yield and income from cultivation of groundnut in comparison with other crops in the cropping pattern of the farmers are discussed in this chapter. Processes involved in groundnut cultivation are given in Annexure. Before discussing the economics, it would be proper to have an understanding about the socio-economic profile of these farmers, especially since they are cultivating groundnut in place of paddy, which is the main crop in the study area.

## 3.1 Socio-economic profile of farmers

## 3.1.1. Age

Age has been reported to be a factor influencing adoption of better farm management practices and commercialization of agriculture, the relationship being inversely related. In other words, studies have indicated that young farmers are adopting better and modern cultivation practices and shifting to a commercial mode of cultivation. Age profile of the sample farmers is presented in Table 3.1.

Table 3.1 Age profile of farmers

Blocks	Age in years			Farmers below Average Age	
	Minimum	Maximum	Average	Number	%age
Surajpur(8)	23	54	36	2	25
Sitapur(6)	25	57	37	2	33
Ambikapur(11)	24	52	36	3	27
Baikunthpur(5)	23	59	35	1	20
Total sample farmers(30)			36	8	27

Figures in brackets indicate the number of sample farmers

The age of farmers ranged from 23 to 59 years with an average of 36 years. Further, 8 out of the 30 sample farmers (26.67%) had age less than the average age of 36 years indicating that majority of the farmers belonged to higher age group.

### 3.2 Social group

Although caste has not been explicitly linked to adoption of modern technology or commercialisation of agriculture, caste-wise distribution of farmers assumes importance, as farming is the only alternative for livelihood. The caste-wise distribution of farmers is presented in Table 3.2.

**Table 3.2 Caste-wise distribution of farmers**

Blocks	Number of Farmers		
	General	OBC	SC/ST
Surajpur(8)	5 (62.5)	2 (25.0)	1 (12.5)
Sitapur(6)	3 (50.0)	1 (17.0)	2 (33.0)
Ambikapur(11)	5 (45.0)	3 (27.5)	3 (27.5)
Baikunthpur(5)	2 (40.0)	1 (20.0)	2 (40.0)
Total sample farmers(30)	15 (50.0)	7 (23.0)	8 (27.0)

**Figures in parenthesis indicate the percentages to total sample farmers under each block**

The analysis indicated that half (50%) of the sample farmers belonged to the general castes followed by Scheduled Tribes/ Scheduled Castes (27%) and OBC (23%) of the total sample.

### 3.3 Education

Education is considered as a factor that favourably influences adoption of modern technology and commercialization of agriculture. It is generally perceived that majority of the farmers may be illiterate. On such premises, the education-wise distribution of sample farmers is presented in Table 3.3.

**Table 3.3 Education-wise distribution of sample farmers**

Blocks	Number of Farmers		
	Illiterate	Primary	Secondary & above
Surajpur(8)	7 (87.5)	1 (12.5)	0(0.0)
Sitapur(6)	4 (67.0)	2 (33.0)	0 (0.0)
Ambikapur(11)	6 (54.0)	4 (36.0)	1 (10.0)
Baikunthpur(5)	4 (80.0)	1 (20.0)	0 (0.0)
Total sample farmers (30)	21(70.0)	8 (27.0)	1 (3.0)

*Schooling up to V std. is considered as primary and VI & above as secondary & above education.*

**Figures in parenthesis indicate the percentages to total sample farmers under each block**

The analysis indicated that majority of the sample farmers (80%) were illiterate. Further, only 3% of the farmers had education of secondary level and above.

### 3.4. Operational holdings

Size of operational holdings is the criterion to determine the size-class of the farmers. For the purpose, all those farmers with less than 2.5 acres of land were classified as marginal farmers, 2.51 to 5.0 acres of land as small farmers, 5.01 to 10 acres as medium farmers and above 10.01 acres as large farmers. Accordingly, the operational holdings-wise distribution of sample farmers is presented Table 3.4.

Table 3.4 Operational holdings-wise distribution of sample farmers

Blocks	Number of Farmers			
	Marginal	Small	Medium	Large
Surajpur(8)	2 (25.0)	3 (33.0)	2 (25.0)	1 (17.0)
Sitapur(6)	2 (33.0)	2 (33.0)	2 (33.0)	0 (0.0)
Ambikapur(11)	4 (36.0)	5 (46.0)	0 (0.0)	2(18.0)
Baikunthpur(5)	2(40.0)	2(40.0)	1(20.0)	0(0.0)
Total sample farmers(30)	10(33.0)	12(40.0)	5(17.0)	3(10.0)

No farmers were operating in leased land

40% of the sample farmers belonged to the category of small farmers followed by marginal farmers (33%), medium farmers (17%) and large farmers (10%). The results show that majority of the farmers who get into groundnut cultivation are small and marginal farmers and not large farmers. The result, especially from Sarguja district indicates that, groundnut cultivation, although requires more care and skill compared to paddy cultivation, a good proportion of small and marginal farmers are able to participate in more remunerative cash crop like groundnut.

3.5 Average size of operational holdings of sample farmers was 6.24 acres which didn't show much variation across the blocks. While the average size was 5.5 acres in Baikunthpur block, it was 6.5 acres in Surajpur and Ambikapur blocks. Blocks-wise size of operational holdings is presented in Table 3.5.

Table 3.5 Size of operational holding

Blocks	Avg. Size of operational Holding(acre)		
	Irrigated	Un-irrigated	Total(NSA)
Surajpur(8)	3.5(53.85)	3.0(46.15)	6.5(100.00)
Sitapur(6)	2.5(41.67)	3.5(58.33)	6.0(100.00)
Ambikapur(11)	3.0(46.15)	3.5(53.85)	6.5(100.00)
Baikunthpur(5)	2.0(36.36)	3.5(64.64)	5.5(100.00)
Total sample farmers(30)	2.87(46.00)	3.37(54.00)	6.24(100.00)

Although the size of operational holdings has marginal variations across the blocks, the proportion of irrigated area in net sown

area had wide inter-block variation. The proportion of irrigated area in net sown area was 64.00% for the sample as a whole and ranged from 36.36% in Baikunthpur to 53.85% in Surajpur block.

### 3.6 Cropping pattern

Analysis of the cropping pattern of sample farmers would facilitate an analysis of the economics of the alternate crops in the area i.e. Paddy. Due to multiplicity of crops in different blocks, the crops were grouped into broad groups like cereals, oilseeds, and vegetables, etc.,. Crops under cereals were paddy only, groundnut under oilseeds, and vegetables included potato, tomato and chillies. Cereals were cultivated during Kharif, while groundnut and vegetables were cultivated throughout the year. The cropping pattern of sample farms is presented in Table 3.6.

Table 3.6 Cropping pattern of sample farmers

Blocks	Area under crops(acres)					Total	Cropping Intensity
	Paddy	Groundnut	Sugarcane	Vegetables			
Surajpur(8)	4.50	2.50(30.30)	0.45	0.80	8.25	126.92	
Sitapur(6)	3.95	2.75(35.71)	0.40	0.60	7.70	128.33	
Ambikapur(11)	4.25	2.60(31.32)	0.50	0.95	8.30	127.69	
Baikunthpur(5)	4.15	2.25(25.57)	1.15	1.25	8.80	160.00	
Total sample farmers(30)	4.21	2.52(30.56)	0.52	1.00	8.26	132.41	

The cropping pattern was dominated by cereals (paddy) in all the blocks. Cropping intensity<sup>3</sup>, calculated after giving equal weightage to all the crops was 132.41% for the sample and was higher in Baikunthpur block (160.0%) due to higher share of sugarcane and vegetables in the cropping pattern. The area allocated to groundnut cultivation was 30.56% of the 'gross cropped area' for the sample as a whole and ranged from 25.57% in Baikunthpur block to 35.71% in Sitapur block.

### 3.7. Borrowings of sample farmers

Farmers, who are engaged in groundnut cultivation, are getting inputs like seeds, fertilisers, pesticides from PACS and other banks either in kind or procured through loans. In general, farmers do end up with cash expenses for land preparation, purchase of seeds, payment to hired labour, harvesting, etc. Further, groundnut cultivation is only a part of the full farming cultivation of the farmer and he is in need of inputs and other cash payments for the cultivation of other crops. The solution

<sup>3</sup> Substantial proportion of irrigated area remained fallow throughout the year ( 64% area was under irrigation)

for such input requirements is the availability of credit, which can take care of the input needs for other crops of the sample farmers by way of crop loans (Kisan Credit Card).

Further, the farmers do make a lot of investments by way of undertaking land development works and digging new wells in case of water shortage in the existing well. Such investment requirements are taken care of by the institutional and non-institutional sources. Against this background, the borrowings of sample farmers<sup>4</sup> from institutional sources during reference year 2005-06 are presented in Table 3.7.

Table 3.7 Borrowings of sample farmers during 2005-06

Type of Credit	Number of Farmers	Agency	Avg. land size(acres)	Avg. Amt. of loans(Rs.)
Short Term/KCC	19(63.34)	CBs - 2 RRBs -5 DCCBs- 12	5.37	22680 18900 11340
Long term	7(23.33)	CBs-2 RRBs-2 PCARDBs-3	6.30	45500 43000 41000
Both ST & LT	4(13.33)	CBs-1 RRBs-2 PCARDBs-1	6.24	68180 61900 52340

Figures in brackets are percentages of lonees to total sample

The farmers who had borrowed from institutional sources were 63.34% for crop loans, 23.33% for investment loans and 13.33% for both purposes. The coverage of KCC was significant as 19 out of 30 farmers had them contrary to one's expectation that the coverage of KCC among sample farmers could be more in the light of 100% coverage under KCC since these farmers have assured and regular inflow of cash income at the harvest of the crop.

### 3.8 Cost of cultivation of groundnut

All the inputs from seeds, fertilisers, pesticides are supplied by the PACs to the farmers. The cost of cultivation of groundnut for the sample farmers and its range are indicated in Table 4.8.

<sup>4</sup> Farmers availing institutional credit were taken for purposive sampling.

Table 3.8 Cost of cultivation of groundnut

Particulars	Average cost (Rs. Per acre)
Land preparation	350(3.77)
Irrigation	325(3.50)
Labour	6000(64.69)
Seed	675(7.27)
Fertiliser	1450(15.63)
Pesticides	475(5.12)
Total	9275(100.00)

Figures in brackets are percentages to total

The cost of cultivation of groundnut worked out to Rs.9275 per acre and it ranged from Rs.8675/- (Baikunthpur) to Rs.9865/- (Surajpur) per acre. Since, inputs are supplied by PACS in majority case; the variation in cost of cultivation could arise from the variations in the expenditures on land preparation, and labour charges. Surprisingly, there were variations in the expenditure on inputs like fertilisers and pesticides, mainly on account of availability in markets and also due to variations in the package of practices followed by farmers across the blocks. Major portion of the cost was for labour (64.69%) followed by fertilisers (15.63%), seed (7.27%), pesticides (5.12%), land preparation (3.77%), and irrigation (3.50%). The average cost of cultivation of Rs.9275 was higher than the scale of finance fixed for the crop at Rs.7500/- per acre.

The cost of cultivation showed variations across the blocks covered under the study. The cost of cultivation in the sample blocks are given in Table 3.9.

Table 3.9 District-wise cost of cultivation of groundnut

Blocks	Average cost (Rs. Per acre)
Surajpur(8)	9865
Sitapur(6)	9570
Ambikapur(11)	8780
Baikunthpur(5)	8675
Total sample farmers(30)	9275

The inter-block variations in cost of cultivation of groundnut were on account of two reasons. Firstly, there were variations in the package of practices especially in respect of seed rate, fertiliser dosages, plant spacing, etc. Secondly, the composition of family labour<sup>5</sup> and hired labour and labour rate prevailed in the locality.

<sup>5</sup> Imputed value of family labour ( @ 75-90 % of labour rate prevailed in the locality) has been taken for the analysis.

### 3.5. Yield of Groundnut

Yield of groundnut varied depending upon the area, the climatic conditions prevailing during the crops season, incidence of pests and disease and the most importantly, the alertness of the farmer in managing the crop. There was also direct correlation between the cost of cultivation and yield level of individual farmers. Although the potential yield for the crop obtained in some of the major producing states like Andhra Pradesh, Rajasthan is 45 quintals per acre, the maximum yield that could be obtained by the sample farmers was 24 quintals per acre. The yield was as low as 16 quintals per acre in few cases (13.33%) and the average yield worked out to 20 quintals per acre for the entire sample. The ranges of yield obtained in various districts are presented in table 3.10.

Table 3.10 District-wise yield of groundnut

Blocks	Yield (quintal per acre)		
	Average	Maximum	Minimum
Surajpur(8)	21	25	18
Sitapur(6)	19	24	16
Ambikapur(11)	20	25	16
Baikunthpur(5)	20	25	17
Total sample farmers(30)	20	25	16

### 3.6. Price of groundnut

The price of groundnut fixed by traders in various local mandies didn't show much variation. The range of prices for different grades of groundnut in the reference year is indicated in Table 3.12.

Table 3.12 Grade wise price of groundnut

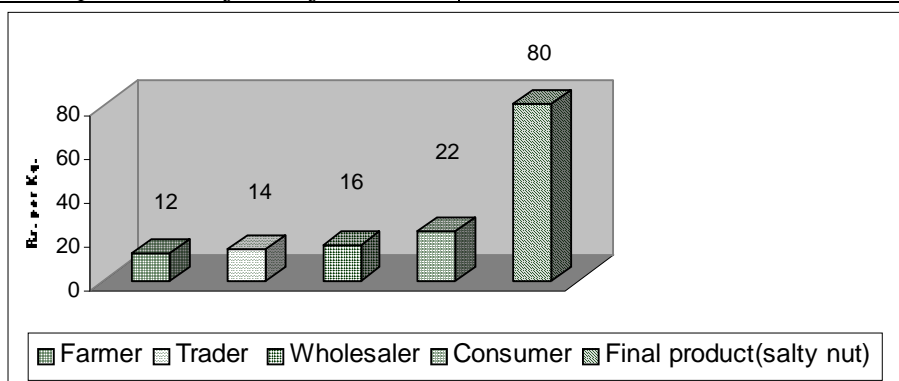
Grade	Colour/Size	Price (Rs. Per kg.)			
		May	July	Dec	Feb
I	Red - long pod	15.50	20.50	13.00	19.00
II	Red - short pod	13.50	18.00	12.00	17.50
III	White - long pod	16.00	22.00	14.00	20.00
IV	White - long pod	14.50	19.50	12.50	18.00

Farmers, as far as possible, were trying to harvest the first & third grade nuts. However, for the sample as whole, the ratio of first and third grade nuts to their total harvest was 55% and the rest were constituted by all other grades, viz. second (26%) and fourth (19%). As far as the grades of the nuts were concerned, the farmers have a tendency to harvest white coloured big size nuts to get more weight and better price in highly volatile market situations. Price of wet groundnut is decided by the traders

giving very little scope for farmers to influence the price. It ranges from Rs.12 per kg in Kharif season and Rs.15 per kg in Rabi season. Price spread ranged from Rs.12 to Rs.22 per kg (Farmers - Rs. 12, Trader - Rs. 14, wholesaler - Rs. 16, consumer Rs. 22 and final product (salty nut Rs. 80 per Kg.). Majority of the traders/wholesalers are from Garwaha and Patna (Bihar) due to close proximity of these places from Sarguja District. (Table 3.13)

**Table 3.13 Price spread of Various Entities**

Particulars	Rs. per Kg.
Farmer	12
Trader	14
Wholesaler	16
Consumer	22
Final product say, salty nut	80



### 3.7 Gross income

Gross income from cultivation of groundnut ranged from Rs.15,000/- to Rs.21,000/- per acre with an average of Rs.18,000/-. The range and average of gross income had block-wise variations mainly on account of variations in yield. Block-wise gross income from cultivations of groundnut is presented in Table 3.12.

**Table 3.12 Block-wise gross income from groundnut**

Blocks	Gross Income (Rs. per acre)		
	Average	Maximum	Minimum
Surajpur(8)	20500	21000	16500
Sitapur(6)	15500	18500	15000
Ambikapur(11)	16500	19500	16000
Baikunthpur(5)	19500	20500	16200
Total sample farmers(30)	18000	19875	15925

### 3.8. Net Income

Net income per acre of groundnut ranged from Rs.5,430/- per acre to Rs.11,135/- per acre with an average of Rs.8525/-. The average income of Rs.8725 per acre was higher than the average income obtained from other major crop (i.e. paddy). The net income obtained from groundnut cultivation is presented in Table 3.13.

Table 3.13 Block- wise net income from groundnut

Blocks	Net Income (Rs. per acre)		
	Average	Maximum	Minimum
Surajpur(8)	10635	11135	6635
Sitapur(6)	5930	8930	5430
Ambikapur(11)	7720	10720	7220
Baikunthpur(5)	10825	11825	7525
Total sample farmers(30)	8725	10600	6650

### 3.9. Income from other crops

Income from other crops in the cropping pattern was estimated in order to serve as a comparison with income from groundnut. Gross income, cost of cultivation and net income from individual crops were pooled to the crop group giving weightage to the area under individual crops. The gross income and cost of cultivation re furnished in Annexure-V and the net incomes, thus, derived are presented in Table 3.14.

Table 3.14 Net income from crops (Amt. in Rs.)

Blocks	Net income per acre		
	Paddy	Sugarcane	Vegetables
Surajpur(8)	4300	11500	7750
Sitapur(6)	3900	9700	7200
Ambikapur(11)	4100	10750	8650
Baikunthpur(5)	4050	10850	6750
Total sample farmers(30)	4087	10700	7588

Net incomes from crops other than groundnut in the cropping pattern were Rs.4087/- per acre for paddy, Rs.10700/- for groundnut and Rs.7588/- for vegetables<sup>6</sup> crops.

### 3.10. Share of groundnut in family income

Family income was calculated as total income from cultivation of groundnut, cultivation of other crops and from dairy & poultry as these activities were prevalent in 24 out of 30 (80%) of the

<sup>6</sup> Seasonality factor of vegetables has been annualised for the comparative analysis of other crops, viz. Paddy & Sugarcane.

sample farmers. Income from subsidiary occupation was not included as sample farmers with subsidiary occupation was negligible (6.67%). The source-wise family income thus derived is presented in Table 3.15.

Table 3.15  
Source-wise income for sample farmers

Blocks	Income(Rs. Per annum)					
	Groundnut	Paddy	Sugarcane	Vegetables	Dairy & Poultry	Total
Surajpur(8)	21250	19350	5175	6200	8250	60225
Sitapur(6)	17600	15210	4875	7200	5450	50335
Ambikapur(11)	19890	17425	5375	8217	8850	59757
Baikunthpur(5)	16762	16807	12477	8437	7650	62133
Total sample farmers(30)	18876 (32.48)	17198 (29.59)	6976 (12.00)	7514 (12.93)	7550 (12.99)	58113 (100.00)

Figures in brackets are percentages to total

The income-earning potential of groundnut cultivation is discernible from the fact that occupying about 30.56% of the GCA, the crop is able to generate 32.48% of the farm family income.

### 3.11. Employment Generation

Groundnut cultivation is a labour-intensive activity and generates a recurring employment of 120 person days per acre per crop. The break-up of labour used for different activities is presented in Table 3.16.

Table 3.16  
Labour use for cultivation of groundnut

Sr. No.	Activity	Labour use (persndays/acre)
1	Land preparation	4
2	Planting	6
3	Weeding+Earthing up	15
4	Feriliser application+Pesticide spraying	7
5	Irrigation	4
6	Harvest(6 x 14 days)	84
	Total	120

Other than the employment generation by way of labour use in cultivation of groundnut, Groundnut oil expelling unit generates employment of skilled and unskilled labourers. An estimate of the employment generated by a local groundnut oil expeller unit is presented Table in 3.17.

Table 3.17

Employment in groundnut oil expeller unit ((capacity: 500 litres filter oil per annum)

Sr.No.	Category of employment	Number of persons
1	Technical staff(skilled)	3
2	Semi-skilled staff	7
3	Labourers +security staff	14
4	Management & accounts	3
	Total	27

### 3.13. Economics of groundnut processing (oil expeller unit)

The initial investment for setting up an oil expeller unit includes the cost of land and buildings, plant and machinery, transport vehicles, etc. These items of investment cost as estimated are indicated in Table 3.18.

Table 3.18  
Investment cost in groundnut oil expeller unit

Sr. No.	Item of Investment	Amount (Rs. In lakhs)
1	Land(2 to 3 acres)	1.50
2	Buildings	0.75
3	Plant & Machinery	1.25
4	Transport vehicle	3.50
5	Furniture	0.50
6	Total	7.50

3.19 For the purpose of calculating economics of groundnut oil expeller unit, the cost of groundnut as a main input was considered as Rs.17 per kg, being the price payable to the first grade groundnut(red in colour + big pod size). The annual expenditures on transport, labour and materials for processing and interest on working capital were calculated per kilogram of groundnut processed during the year. The cost involved in processing one kilogram of groundnut thus calculated and its return are presented in Table 3.19.

Table 3.19  
Economics of groundnut processing (oil expeller unit<sup>7</sup>)

Sr. No.	Particulars	Amount (Rs.per Kg.)
1	Avg. cost of wet groundnut	17.00
2	Transport	1.50
3	Processing cost - labour	3.00
4	Processing cost - Materials	5.50
5	Other/Overhead cost	0.50
6	Interest on working capital	1.20
7	Total cost	28.70
8	Sale price/factory price	36.50
9	Net Income	7.80

3.20 Considering the importance of groundnut oilseeds production to agricultural economy, the State Government has made effort to popularise the basic oilseed production technology by way of improved varieties of seeds, fertilizer recommendations and plant protection schedules. The basic constraints impeding acceleration of production of the oilseed crops in general and groundnut in particular included the predominantly rainfed cultivation of this crop, cultivation in soils of poor fertility, high degree of susceptibility to pests/disease and adverse seasonal conditions.

3.21 Despite the importance attached during various Plan periods to the development of oil seeds, the then available technology was incapable of insulating oil seed production from adverse seasonal factors resulting in severe fall in production and violent price fluctuations. Many research centres in the Chhattisgarh State and other states were engaged in evolving new varieties of seeds. Mixed response was reported regarding the facilities like farm land, irrigation, trained staff, etc. available to these centres.

3.22 The recommended varieties of seeds were universally adopted by the sample households in case of groundnut. The recommended seed rate was adopted by well over half of the selected households in respect of groundnut. Though, Groundnut

<sup>7</sup> Oil Mills are very similar to ghanies but are operated by power. The usual capacity of a mill is 10 to 15 kg per charge which is crushed in 20 to 30 minutes. An expeller consists of a flight of steel worms on a shaft revolving inside a steel cage. The worms are so arranged as to produce a gradually increasing pressure on seeds. Oil is expelled through perforation in the steel cage and the cake comes out from the opposite end. The expeller cake has an oil content of about 7 percent.

was mainly cultivated by small and Marginal farmers, extension efforts like field demonstrations, group Meetings, etc. were conspicuously lacking. About two-third of the sample households had adopted farm yard manure/compost for groundnut. The adoption of chemical fertilizers as a "basal doze" was limited in respect of groundnut and "Top dressing" with nitrogenous fertilizers was not a recommended practice in the selected district i.e. Sarguja.

3.25 For groundnut, only 3% to 4% of the sample households acknowledged the adoption of preventive plant protection methods whereas 20% reported the adoption of curative methods.

3.26 Most of the suggestions mooted for the development of different oilseeds converge to invoke the shedding of the adhoc approach for increasing their production and the framing of a long-term strategy for the same. The prime constraint in this respect has been rainfed cropping of oilseeds. Oilseeds require light irrigation through protective waterings. Concerted efforts must be made to bring larger irrigated area under the Oilseeds Development Programme.

3.27 Evolving high-yielding varieties of oilseeds is of utmost importance for increasing yield. Research Centres should be activated and infrastructural facilities should be strengthened to this effect. Suggestions for the development of different oilseeds emphasise the need for strengthening the organisational set-up at the district level, decentralising the planning process to local levels to formulate realistic targets, boosting the local production of farm-yard manure and modernising the preparation of compost, undertaking effective extension work through demonstrations, group meetings, supply of technical literature, etc., replacing seeds periodically to maintain their purity, inducing an integrated and organised system of supplies-cum-credit-cum marketing facility and providing the facility of scientific grading.

3.28 It is suggested in respect of groundnut that adequate incentives through subsidies, credit and technical assistance should be given to enhance the use of chemical fertilizers and plant protection materials. Considering the perceptibly unexplored potentials for the cultivation of groundnut oilseed crop, there is an urgent need to gear the implementing machinery of the Scheme to better the performance in this particular aspect.

## Chapter - 4

### Marketing and Processing Aspects

Marketing of groundnut in general refers to marketing of peanut, groundnut oil, oil cake, etc. However, based on the field observations, the marketing aspects of groundnut are discussed in several parts i.e. i) marketing of groundnut, ii) marketing of groundnut oil and cake.

4.2 Most of the states groundnut arrivals are spread over all the four quarters of the marketing year beginning October. While in Andhra Pradesh, Karnataka, and Tamilnadu the market arrivals are 30 percent between October and December, in case of Gujarat, Madhya Pradesh, Maharashtra, Punjab and Uttar Pradesh these arrivals are more than 40 percent, and for chhattisgarh we find that the market arrivals<sup>8</sup> are distributed as follows: 38-40 percent October to December, 28-30 percent January to March, 23-25 percent April to June, and 10-12 percent July to September.

4.3 The reason behind this is that the small farmers, who are not capable of holding the produce and needing cash as soon as possible, bring their produce to the market immediately. The big farmers are not that in immediate need of cash, hold their produce with them and sell when the price goes up. Besides, some rich farmers buy the produce from small farmers, who are not capable of holding the produce and needing cash as soon as possible, bring their produce to the market immediately. It has been observed that almost the entire function of storage of groundnut pods for sustaining the crushing operation is undertaken by the farmers.

4.4 Although there are day-to-day fluctuations in oil and oilseed prices, average monthly prices of both oil and oil seed display an increasing trend as the marketing year progresses.

#### Preparation for the Market

Bulk of the groundnut is sold by the farmers as pods and small percentage as kernels. Shelling of the pods is done at intermediate stages as the produce reaches the millers and

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<sup>8</sup> Range of market arrival has been assessed during field study and discussion with various stake holders viz, agents, wholesalers and mandi officials.

exporters outside the states in the form of kernels. Shelling reduces volume and transport charges but it is disadvantageous to market the kernels as they easily and quickly undergo deterioration and spoilage. Grading of groundnut is a prerequisite before mechanical shelling to keep the percentage of kernel breakage to a minimum. Better prices are also obtained in the market for graded pods. When groundnut is to be sown, women labourers are employed for breaking the pods and taking out the kernels. In doing so, the testa of the kernel also get separated to a considerable extent making it useless for sowing, because such damaged kernels will not germinate. Groundnut decorticators, therefore, have been designed. Two types of decorticators (shellers) are in use viz., the rotary and the oscillating types. Among the rotary types, there are both hand-and power-operated ones. About 80-100 kg of pods can be shelled in an hour with the ordinary hand-operated decorticator. There are improved types which can shell 125 kg pods per hour. The percentage of broken kernels in this type of decorticator is lower. The power-operated decorticators are of 2 types viz., the grate and beater types. The grate type is preferable as the percentage of broken kernels is less in it. As the owners of decorticating establishments charge for every unit bag of groundnut pods shelled, they aim at maximum out-turn per hour and so they run the machine at high speed unmindful of the breakages of kernels in this process. Precautions have to be taken to reduce the splits and broken kernels in the process of shelling as large percentage of split and broken kernels reduces the quality and fetches lower price. Power-operated decorticators shell about-400-500 kg pods per hour.

### Marketing Practices

4.5 About 70 to 80 per cent of the marketable surplus of groundnut pods is taken by the farmers personally to the markets in the study area. The disposal of the produce, either at the market or in the village is, however, often closely connected with indebtedness. When the produce is sold to the creditors in the village or in the local market, the prices paid to the farmer are much lower than the regulated market rates. The seller has to pay tolls, taxes, commission, labourers' wages, weighment charges and deduction for charity. Deductions are also made for quality, impurities, moisture, etc., even though all these have been taken into account at the time of price settlement. In the regulated markets, certain amenities are provided to sellers and exorbitant market charges and deductions in settled price are not made. The number of regulated markets and volume of produce

handled by them are still inadequate. It is necessary that regulated markets are started in all groundnut producing centres including the study area.

4.6 The methods of sale generally adopted are: (a) the cover system, (b) the open system, and (c) the auction system. There is great diversity in the use of weights and measures in the groundnut trade. The pods are sometimes sold by measure. In other areas, the main source of the farmers finance is the village merchant who advances small amounts for agricultural operations and other expenses. Wholesale merchants are owners of shelling (decorticating) establishments and they advance money to the village merchants and in a few cases to the farmers in the nearby villages. The banks confine their activities to big towns and advances are made to merchants against produce in the godowns pledged to the Banks. But these are the situations pertaining to other major producing states. Credit has to be made available in the village by the Banks directly to the farmers to get them out of the clutches of the greedy local merchants so that they could secure good price for their produce.

4.7 There is export trade for edible kernels. These kernels should be bold, clean and without any blemishes. In the export trade, these kernels are styled 'hand picked selection' (HPS) and fetch enormous prize. There is considerable scope for expansion of this trade even in the study area. i.e. Sarguja district in Chhattisgarh. Farmers should take advantage of this and grow bold seeded varieties under irrigation. These kernels are used in bakery and confectionery industry and also directly for edible purposes.

#### Marketing channels of Groundnut Oil

4.8 The small part of groundnut oil(30-40%) routed through refineries mainly goes through brokers. In our sample study area, this share is very negligible. The channel is refineries-Wholesalers-retailers-consumers. The bulk of the oil, which is only filtered, goes through the brokers-wholesalers-retailers-consumers for sale within the state. For outstation sales, the channel is broker-commission agent-wholesalers-retailers-consumers.

#### Brokers/ Commission agent

4.9 Brokers arrange the business between buyers and sellers either through commission agents or on their own. The major

portion of oil<sup>9</sup> is sold through the commission agent. Mostly all business outside the state is done through the commission agent. Commission agents purchase oil from the millers. The marketing costs including commission, sales tax, packing, etc., are borne by the miller. The commission agents arrange transport and other facilities for delivering the oil to a wholesaler (outstation) either by rail or by road.

#### Wholesaler and Retailers

4.10 The wholesaler buys groundnut oil either directly from the miller or through a commission agent or a broker, and in turn sells to another intermediary or to the final user. Most of the wholesalers have their own retail outlets and do multiple functions, that is, wholesaling as well as retailing. In wholesaling as well as bulk retailing business, they arrange delivery to the consumer's door at their cost. Normally, a wholesaler never keeps stock for a long time because in the oil business rotation of money is more remunerative than stocking.

4.11 The retailers usually deal with a variety of household and consumer goods. They buy a small quantity. They keep the stock of not only one brand but also many brands, and in large number of cases. Oil is sold in loose form. Maximum sales of oil are between December and March in Sarguja district.

#### Marketing channel of Groundnut Oilcake and Deoiled cake

4.12 After oil is extracted, the oil cake goes to a solvent extraction unit either directly or through a broker. The major portion is handled by brokers. A major portion of deoiled cake is exported. Two channels operate in the domestic market for deoiled cake.

1. Producer to final user through broker.
2. Producer through broker to wholesaler to retailer to the final user.

Though, this process is not operational in Sarguja district, but it has a scope in near future.

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<sup>9</sup> In sarguja district, the share ranged from 60-75 % in two different harvesting seasons.

## Trade in groundnut

4.13 The trade performs the functions of assembly, transportation, broking, and rarely, storage in moving the produce to the mills. Though marketing channels differ somewhat from state to state, but in Chhattisgarh, following channels are in operation.

1. Producer to village trader who in turn sells either directly to mills or indirectly through wholesalers or commission agents in outside the State.
2. Producer to commission agents to millers wither directly or through wholesalers (outside the State.
3. Producer to broker who sells to millers directly or some times through wholesalers.
4. Producer to millers directly.
5. Producer to cooperative society to cooperative oil mills.

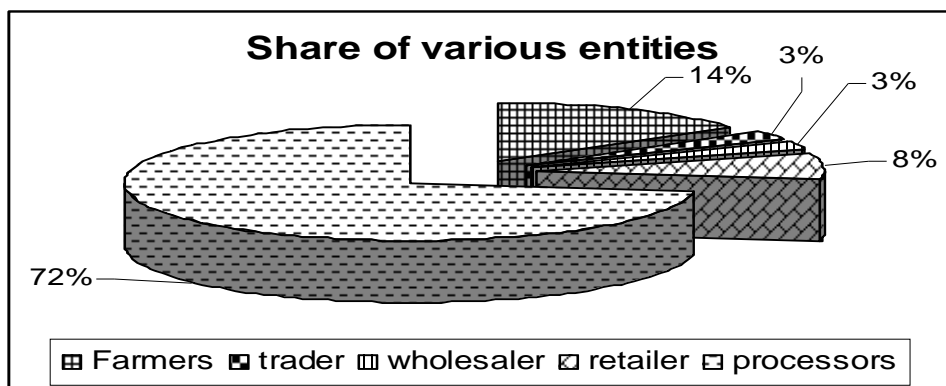
## Village Trader

4.14 The village trader procures from the farmer at the farm itself. He need not bring the produce to the market. All the marketing costs are borne by the trader. The normal procedure of payment to the farmer is after the produce is sold in the market. These traders sometime directly sell the seeds to the miller and sometime through a commission agent who in turn sells to a wholesaler, or directly to millers.

## Processing of Groundnut

4.15 Groundnut is processed by the organised and unorganised traditional sectors. It is estimated that about one-seventh of the output is crushed by the unorganised sector at national level. However, the share is very negligible in the study area. Processing activities are taking place in neighbouring state like Bihar & Uttar Pradesh. Price of wet groundnut is decided by the traders giving very little scope for farmers to influence the price. It ranges from Rs.12/- per kg in Kharif season and Rs.15/- per kg in Rabi season. Price spread ranged from Rs.12/- to Rs.22/- per kg (Farmers - Rs. 12/-, Trader - Rs. 14/-, wholesaler - Rs. 16/-, consumer Rs. 22/- and final product (salty nut Rs. 80/- per Kg.). Majority of the traders/wholesalers are from Garwaha and Patna (Bihar) due to close proximity of these places from Sarguja District.

### Share of various entities in the marketing channel in the consumer's Rupee



### Village Ghanies

The ghanies are driven by bullocks and these are mostly used in rural areas of the study area. They vary in size but in all cases the principle of operation is the same: a pestle rotating in a mortar. Oil is extracted within the mortar as a result of friction caused by the revolving pestle. The capacity varies from 8kg to 25 kg per charge depending on the size of the mortar. It takes two to three hours to crush a charge and three to five charges can be handled in a day. Some of the improved ghanies can crush a charge in less than one hour. Oil yield from ghanies is generally five to ten percent less than that from expellers.

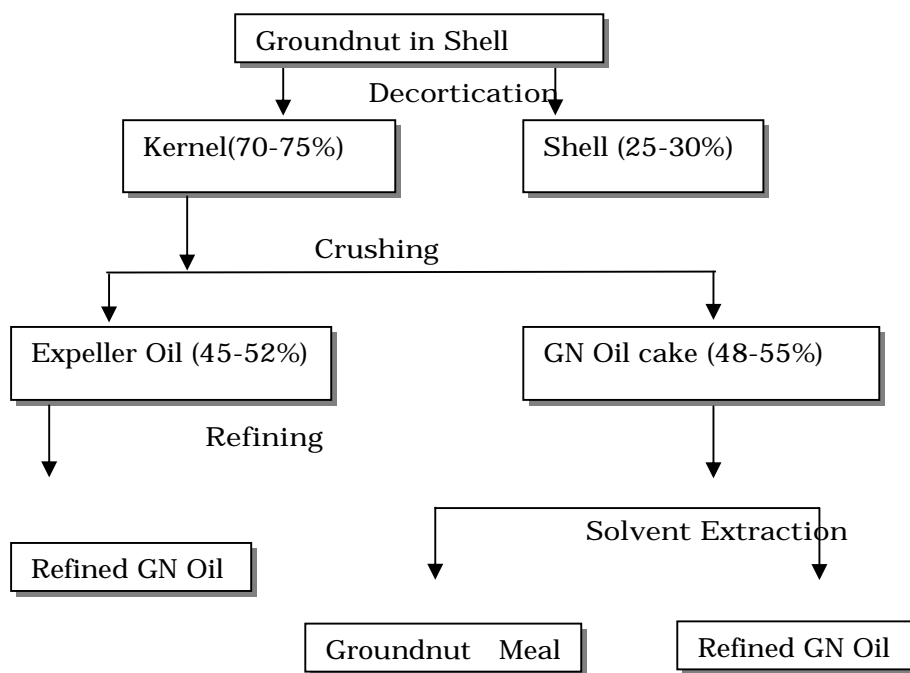
### Oil Mills

4.17 Oil Mills are very similar to ghanies but are operated by power. The usual capacity of a mill is 10 to 15 kg per charge which is crushed in 20 to 30 minutes. An expeller consists of a flight of steel worms on a shaft revolving inside a steel cage. The worms are so arranged as to produce a gradually increasing pressure on seeds. Oil is expelled through perforation in the steel cage and the cake comes out from the opposite end. The expeller cake has an oil content of about 7-8 percent. Since there are only 2 expellers in the Sarguja district, around 18 to 22 percent of total production is used for extraction of groundnut oil (filter oil) in neighbouring districts like Raigarh and Bilaspur.

### Solvent Extraction plants

4.18 In solvent extraction plant oil bearing material is brought into contact with a solvent (hexane) to release the entrapped oil. To achieve complete extraction, the solvent is percolated several times. This process is extremely useful for oil cakes having very low oil content which cannot be extracted otherwise.

Processing flow chart for processing of groundnut into groundnut oil:



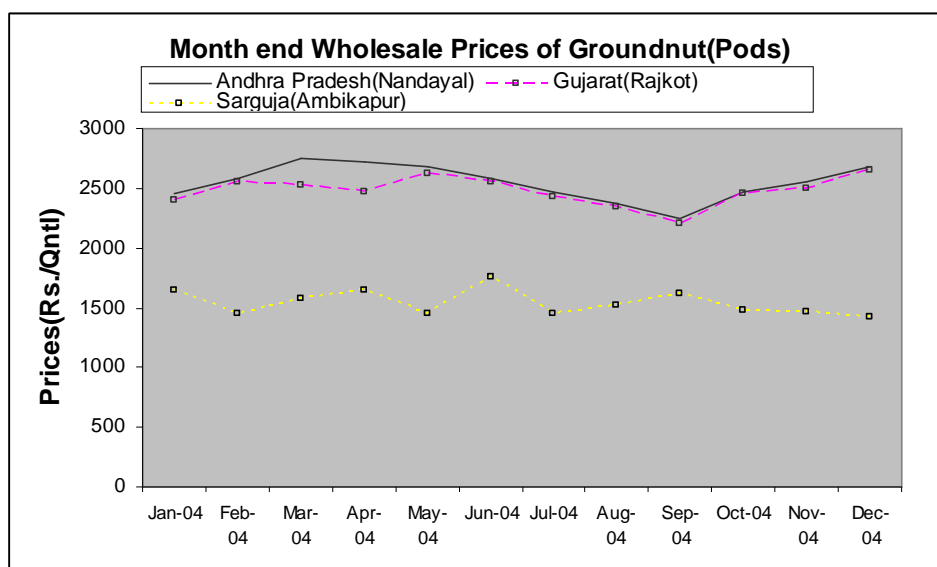
### Price spread

4.19 Price trend of Groundnut pods & Oil in India clearly shows that the main producing states i.e. Andhra pradesh & Gujarat prices are going in conformity to the local demand and supply whereas, the prices in Sarguja district are independently moving upwards throughout the time span. In order to have comparative analysis of month-end wholesale prices of groundnut(pods) for selected market for the year 2004 are given below.

Table 4.1  
Month end wholesale prices of groundnut(pod) (Rs. Per quintal)

	Andhra Pradesh (Nandayal)	Gujarat (Rajkot)	Sarguja (Ambikapur)
Jan-04	2450	2400	1650
Feb-04	2575	2550	1450
Mar-04	2750	2525	1570
Apr-04	2725	2475	1640
May-04	2675	2625	1450
Jun-04	2575	2550	1760
Jul-04	2475	2425	1450
Aug-04	2375	2350	1525
Sep-04	2250	2200	1625
Oct-04	2475	2450	1475
Nov-04	2550	2500	1460

Chart 4.1  
Month end wholesale prices of groundnut(pod) in different markets



4.20 At present, auction centres/mandies is the only available and reasonably reliable channel for marketing groundnut. In general, auction facilitates equitable distribution, increases competition, helps in price discovery, improves grading and packing and brings all prospective buyers from various centres to a common trading place. However, existing mandies/auction centres have to sort out some of the shortcomings in regard to capacity of the auction centres, bidding time, proxy bidding, buyers' identity, clock system and on line trading.

## Chapter - 5

### Value addition and scope for Export

With the changing agro-socio economic situation in the country, export of groundnut and byproducts has a very bright future. The HPS groundnut is traditionally an export earner. The HPS has to be treated as a high value crop to be grown in identified areas under high inputs and assured moisture. Considering the fact that India is one of the largest producers of groundnuts in the world and current export figures (Table 5.1), India has a much larger potential to supply high quality groundnuts to the international buyer.

5.2 Indian groundnuts are available in different varieties: Bolds or Runners, Javas or Spanish and Red Natsals; and have a rich nutty flavour, sweet taste, crunchy texture and a relatively longer shelf life. Groundnuts in India are available throughout the year due to a two-crop cycle harvested in March and October. On an average, India produces 8-9 million tonnes of groundnuts (unshelled) every year. The awareness and concern for quality amongst the Indian groundnut shellers and processors are growing steadily. Multiple sorting and grading are fast becoming a norm. Indian shippers have the capability to prepare and supply edible peanuts conforming to highest standards.

Table 5.1 Major country-wise Export of Groundnut ('000 tonnes)

Country	2000-01	2001-02	2002-03	2003-04	2004-05
Japan	91	160	18	299	131
Singapore	3,012	2,885	2,304	5,323	5,387
Philippines	5,999	7,132	1,319	13,707	10,836
Malaysia	19,610	17,976	15,040	36,169	45,229
Indonesia	73,718	61,917	35,538	58,834	62,586
China	0	0	0	551	1,026
India	158	137	112	236	258
Other Far East	1,072	801	2,131	2,363	233
Persian Gulf	2,152	1,703	636	3,880	4,634
United Kingdom	11,278	6,460	1,798	11,914	13,264
Holland	596	187	116	5,389	4,422
Germany	332	587	132	935	1,557
Other West Europe	828	604	273	4,542	3,747
Ussr / Russia	2328	166	0	56	409
Ukraine	2253	4,294	1,104	2,363	3,518
Others	13,489	7,682	5,157	30,606	10,521
Total (M/Tonnes)	136,758	11,2554	65,566	176,931	167,500
Value (Rs. In Crores)	316.76	250.40	173.77	544.09	50,169.13

Source: DGCI &amp; S, Govt. of India, March 2005

Table 5.2 Production and Export of Groundnut from India\*

Year	Total production (in '000 Tonnes)	Export (in '000 Tonnes)	% age share
1994-95	7510	27.3	0.36
1995-96	7090	2.9	0.04
1996-97	8560	4.3	0.05
1997-98	7830	236.5	3.02
1999-00	8061	51.1	0.63
2000-01	7579	158.1	2.09
2001-02	8642	137.4	1.59
2002-03	7370	112.2	1.52
2003-04	8981	236.3	2.63
2004-05	9745	258.3	2.65

Source: CMIE, various issues

5.3 It may be observed from the Table 6.2 that our export both in terms of volume and its share in the production has shown increasing trend. The major constraints in export of groundnut are largely on account of stiff competition in the international market. Our future production strategies should aim at emerging market preferences, product diversification, value addition, assured quality, introduction of new varieties in rain-fed condition and minimising the intermediators both in the supply and market chains.

## Chapter - 6

### Conclusion & Policy Implication

Groundnut is the major oilseeds crop accounting for 45 percent of oilseeds area and 55 percent of oilseeds production of the country. But the current average yield level of 748 kg/ha is deplorably low as compared to what is being obtained in most of the groundnut growing countries in the world. One of the main reasons for the low yield of production in the country is the wide scale non-adoption of newer varieties.

6.2 Further, groundnut as a major oilseeds and Its Importance in Indian Economy is as follows:

- Groundnut can withstand drought and is suitable for dry land farming.
- It is a soil erosion resistant crop and being a legume crop, it can fix the atmospheric Nitrogen and thereby improve the soil fertility.
- It provides a good green manure for succeeding crop.
- Its shell, skin, hulk and hey are all good for fodder.
- Groundnut cake is chief oil-cake feed to animals and it is also used in manure.
- The plant stalks are fed to cattle in the form of green, dried and silage.

6.3 Groundnut is an important crop both for oil and food. The main use of groundnut is as a source of edible oil, but the high oil and protein contents also make it an important food crop. Groundnut shell is used as fuel for manufacturing coarse boards, cork substitutes etc. Groundnut is also of value as rotation crop. Being a legume with root nodules, it can synthesize atmospheric nitrogen and therefore improve soil fertility.

6.4 At the present level of demand and contribution of groundnut by 2020 AD, India will require about 14 million tonnes of groundnut. The present production level is around 9.7 million tonnes. Therefore, a gap of about 4.3 million tonnes has to be filled which calls for a growth rate of 2.2% per annum in the production. The growth has to come more from the increase in productivity and less from increase in area and irrigation potential. On the other hand, the situation for kharif groundnut which will remain mainly rainfed is not expected to become

better in the years to come unless well thought-of clear steps are initiated right now. Some of the strategies which are likely to meet the future requirements and raise the total production are the following.

- i) Increase in area in traditional belt through crop diversification and increased cropping intensity.
- ii) Crop substitution i.e. Rainfed-upland rice by groundnut in areas of Orissa, Tamil Nadu and Andhra Pradesh
- iii) Use of organic mulch for better management of high and low temperature and conservation of soil moisture.

Factors influencing high cost of production

6.5 Major input cost components in groundnut cultivation in India are seed cost and labour component. Seed is the major item of input cost varying from 35 to 46% for irrigated crop and 26 to 37% for rain-fed crop. Human labour occupies the second place in the cost structure which varies from 23 to 25%. The seed rate used in India is more than twice the seed rate used in other major groundnut-growing countries. Better methods of drying and storage of seed-pods, better pod and seed selections and seed treatment with fungicides may lead to reduction in seed rate per hectare. If farmer use their own seed from previous crop they can avoid purchasing seed at exorbitant cost in the season. Use of power-operated shellers will reduce the cost of shelling considerably. Line sowing with seed-drills helps to regulate seed rate and coverage of large areas within a short time, reducing the cost of seeding. Line sowing also facilitates intercultivation with bullock-drawn implements and reduces cost on manual labour for weeding. Groundnut diggers operated with bullocks or tractors have to be popularized to reduce the harvesting costs. The investment on labour costs may thus be reduced considerably by using mechanical equipment available for carrying out various operations from sowing to harvest and grading of groundnut pods. The spending on fertilizers and plant protection has to be increased so that higher productivity is achieved and the cost of production of a unit of pods is reduced. Farmers are reluctant to invest on fertilizers and pesticides because of the risks involved in raising rainfed groundnut crop due to uncertainty in receipt and distribution of rainfall during the crop period leading to instability in production and productivity and widely fluctuating price pattern due to intense speculative trade in groundnut. If price support is offered to the farmers, they may spend more on inputs like fertilizers and pesticides and increase productivity. Shelling of seed-pods by manual labour is a costly operation. The sowing period is short and the market price of seed is very high at sowing time. Harvesting by pulling our plants is another

operation requiring considerable manual labour. The large number of labourers engaged in stripping of groundnut pods may considerably reduced using mechanical strippers.

#### Cost of cultivation

6.6 The costs and returns normally tend to fluctuate responding to the economics situations, and such changes in the physical units, whether inputs or outputs, are only marginal.

6.7 Following strategies could be adopted in groundnut cultivation for higher yields;

- i. Using the improved variety recommended for the tract.
- ii. Using good and bold seeds for sowing.
- iii. Treating the seeds with fungicides , Captan or Thiram at the rate of 4g/kg of seed
- iv. Inoculating seed with the culture of Rhizobium in the soils where groundnut is a new introduction.
- v. Sowing at the optimum time ,using the optimum seed-rate and optimum spacings.
- vi. Using adequate quantities of balanced fertilizers ,depending up on the tract, variety,Season. etc
- vii. Applying 500 kg of well -ground Gypsum per hectare at the pegging stage.
- viii. Controlling weeds in time with inter cultivation coupled with hand-weeding or by applying pre-emergence weedicides, like Alachlor at the rate of 4 liters a.i /ha.
- ix. Applying micro-nutrients wherever their deficiency is noticed.
- x. Adopting timely plant-protection measures for controlling pests and diseases.
- xi. It is most important to select a level field as far as possible and good drainage should be provided for the oil seed crops, especially for the kharif crop. Water logging conditions are harmful for these crops.
- xii. A fine seed bed free from weeds and clods should be prepared to facilitate good germination and stand.
- xiii. Harvesting should be done at right time to avoid capsule shattering and reduction is oil content of seed.
- xiv. The seed should be cleaned and dried well before storage.

6.8 Insurance products under Rashtriya Krishi Bima Yoyana(RKBY) may have to be implemented for income risk in case of groundnut farmers.

6.9 Groundnut sector has potential to grow by improving productivity and production for which institutional credit is a must. Credit is needed for cultivation of the crop, irrigation and related in the farmers' fields, setting up of processing units, export credit, etc,. Banks should provide credit to the farmers/processors/exporters for the purpose keeping in view the Banking Plans(PLPs) by NABARD.

6.10 Banks may consider micro-irrigation system and fencing as major components for extending investment credit along with extending KCC to take care of higher production and productivity.

6.11 Using Farmers' Clubs for propagating the message of contract farming would help both the companies as well as the farmers who are willing to take recourse to contract farming. This will also ensure linking of these farmers with bank branches for their credit needs.

## ANNEXURE

### Groundnut Varieties Of India

The cultivated groundnut (*Arachis hypogaea* Linn.) has three distinct botanical groups viz., pish (Sub sp. *Fastigiata* var. *vulgaris*), Valencia (Sub sp. *fastigiata* var. *fastigiata*) and Virginia (sub. Sp. *hypogaea* var. *hypogaea*). The pish and valencia types popularly called as "Bunch" grow erect, possess light green foliage and produce pods in clusted at the base of the plant. The seeds are non-dormant and roundish with light rose testa (deep rose or purple testa in valencia). The virginia group which includes both virginia bunch (Semi-spreading) and virginia runner (spreading) types, on the other hand, possesses dark green foliage and the branches trail on the soil surface either partially or completely. The main stem is devoid of fruit and pods are scattered all along the branches. The seeds are dormant, oblong in shape with brownish testa. In general, the spreading and semi-spreading varieties mature late as compared with the bunch varieties.

Groundnut is cultivated commercially in both Kharif as well as Rabi/summer seasons. In kharif (rainy) season the crop is grown under rainfed conditions between May to December by planting varieties belonging to different habit groups. In contrast, during Rabi/Summer (post rainy) season the varieties belonging to pish bunch and valencia are preferred for their shorter duration and are grown under irrigated conditions. Timely field preparation facilitates timely sowing which ensures higher yield. Initial ploughing should be carried out at optimum moisture range in order to get better tilth. Number and depth of ploughings depends on weed intensity, size of the crop seed to be sown, rooting pattern of the crop, type of tilth required. Minimise number of ploughings as far as possible in order to reduce cost of cultivation since certain crops may not require thorough fine tilth. Summer ploughing is always advantageous and hence takes up wherever possible. Summer ploughing is very common if summer showers are received or profuse irrigation water is available. After initial ploughing wait for 4-5 days in order to reduce moisture content of the clod and subsequent ploughings and harrowings better physical condition of soil could be obtained with less operation. Harrowing of soil should invariably followed after each ploughing facilitates to reduce the clod size. Tillage operations should be repeated when the weed seeds are just germinated. Whenever it is possible plough the land immediately after harvesting of the

previous crop. Initial ploughing should not be carried at excess or under moisture conditions.

In general, equipments viz., Country plough, Gorru without seed hopper, Guntaka (Blade harrow), Cultivator (Tractor drawn), Mould board plough (Tractor drawn), Ridge plough (If the crop planted on ridges), etc. are used depending upon the requirement as per agro-climatic condition

#### Land Levelling

After getting suitable and required tilth of soil, land should be perfectly levelled by using bullock-drawn or tractor-drawn levellers. Levelling helps in irrigating the fields with high water use efficiency. Also helps in draining excess water without stagnation in heavy rainy days or immediately after giving irrigation.

#### Land Preparation

Land is required to be prepared well to provide an ideal seed bed for sowing groundnut as well as to control weeds, facilitate drainage and destroy harmful insect pests by exposing the subsoil to the hot sun. An ideal soil physical condition with adequate supply of moisture, oxygen and optimum soil temperature and freedom from mechanical impedance is necessary for good seed germination, seedling emergence and root growth. Optimum plant population of groundnuts can be established with a seed bed having good tilth. Objectives of land preparation includes complete burial of all crop residue and weed seed as well as the applied lime and fertilizer, and the formation of a deep, friable, smooth, levelled but slightly raised seedbed to provide maximum moisture retention, precision planting, for efficient seed germination and for effective weed and disease control. The rainfall intensity and soil type determine the type of land preparation for rainfed groundnut. In parts of India, after the harvest of the previous crop, soil is prepared by ploughing and harrowing several times before sowing of groundnut. Ploughing may be carried out after the receipt of premonsoon rains in May. The land is ploughed 2 to 3 times or more, followed by working with blade - harrow twice.

### Set line cultivation

In black soils, instead of ploughing, blade-harrow is worked several times after the receipt of South - West monsoon rains. After the land is turned deep with a mould board plough equipped with a litter burial device, the final seedbed is prepared to accomplish a completely flat level bed with wheel tracks established by tracking off the land immediately after turning or by using precision power - driven rotary tiller. Only the rows are ploughed and inter - row spacing is cleared of weeds by harrowing. The available organic residues, farm - yard manure and fertilizers are ploughed into the row before sowing groundnut. The set - line cultivation has been found to increase infiltration rate in the row and thus more moisture is conserved. The general fertility of soil in the row increases. The inter - row spacing may be reduced up to 60 cm for virginia - runner types and 45cm for pish - bunch type groundnut. Groundnut crop requires a thorough preparation of the soil before sowing. Higher pod yields and lower loss of pods were reported by using mould-board plough for land preparation as compared with the disc - harrow. also higher groundnut yields were obtained when land was ploughed with a mould-board plough in the fall (December) than when ploughed in the spring (March), though the yields were not influenced by the method of land preparation. A depth of soil preparation beyond 15 - 20 cm is generally not considered for groundnut cultivation, since deep ploughing tends to form pods in deeper layers, rendering the harvesting of groundnut crop more difficult.

### Minimum Tillage

The number of ploughings did not influence the pod yield of groundnut and spraying of gramoxone at 2.5 litres / ha was as effective as all the tillage methods tried. The rainfed groundnut could be sown on the sandy - loam soils immediately after receipt of the rains without loss of time in land preparation. The weeds can be effectively controlled by either alachlor at 2 kg / ha or nitrofen at 1 kg / ha with supplemental hand weeding to obtain pod yields comparable to conventional tillage of four ploughings with country plough.

Preparation of medium - textured soils in the command areas of irrigation projects as well as the saline soils with poor drainage poses problem. Clods are formed when the soil is ploughed at more than optimum moisture content. The puddled soils in the case of rice as a previous crop have more moisture (22.6%) than

the unpuddled soil (16.3%). These soils dry much slower, the ploughable soil moisture range reaching after 4 and 10 days, respectively. Puddling black soil decreases the infiltration rate by about 4% and reduces the percentage of non - capillary pores. The puddled soil thus retains more moisture than the unpuddled soil, considerably delaying the tillage operations for the subsequent crop.

### Soil Crusting

Unfavourable physical condition of the surface soil hinders the pegging process. The pegs containing the fertilized ovary must penetrate the soil surface 2 cm deep before the pods can develop. The surface soil becomes hard, especially in sandy-clay loams when there is a prolonged dry spell during the crop growth. One centimeter of the soil beneath the groundnut plant dries to wilting point within about 48 hours of the rain and peg penetration is hindered if the prolonged dry spell coincides with the peg elongation and penetration phases. The bulk - density of the surface soil exceeding 1.6 g / ml have been reported to hinder peg penetration significantly.

### Seed Rate

In rainfed situation, Tirupati - 1, 2 Vemana like bunch varieties require 120 kg/ha. The same varieties, in irrigated conditions requires 140-150 kg/ha. JL -24, Kadiri -4 like bunch varieties requires 140-150 kg/ha in Kharif, in Rabi in irrigated conditions requires 190-200 kg/ha. Generally spreading bunch varieties requires 90-100 kg/ha in Kharif, in rainfed situation. In rabi, in irrigated conditions requires 140-150 kg/ha.

### Seed treatment with chlorpyrifos

Treat the seed with Mancozeb or Triram 3 gm/kg of the seed. Chlorpyrifos @ 250 ml / 45 kg of seed to prevent the seed damage from soil insects at initial stages.

### Seed planter

In optimum condition of moisture in the soil, sow the seed with Gorru or country plough, not more than 5 cm depth.

### Sowing distance

In rainfed condition, for the bunch varieties 30 x 10 cm , For the spreading varieties 30 x 15 cm , In Rabi, in irrigated conditions, for the bunch varieties 25 x 10 cm , For the spreading varieties 30 x 10 cm

### Harvesting

In developing countries like India Groundnuts are usually harvested manually using cheaper human labour, groundnut harvesting and curing operations are highly mechanized in the developed countries. The mechanization has reduced the harvest periods and labour requirements, but has increased growers capital requirements and technical knowledge requirements and contributed to processes and marketing problems. Improper harvesting and curing practices often contribute to significant losses during harvesting and post - harvest operations, negating good groundnut production practices. Poor and inefficient harvesting and curing may adversely affect groundnut quality with respect to milling or shelling characteristics, mould development, oil quantity, seed germination and flavour. Groundnut harvesting involves the removal of groundnuts from the ground and separating them from the soil and vine. These operations may include field preparation, vine clipping, digging, shaking, winnowing and combining. Groundnut curing refers to the process during which the moisture content of groundnut is reduced to a safe level for preservation of groundnut quality. Along with the removal of moisture many physiochemical changes take place during the curing process, influencing the flavour and quality of groundnut.

### Digging and stripping

Groundnut harvesting should be carried out in bright sunshine so that the pods and vines can be dried thoroughly. Prevalence of high humidity during harvesting should be avoided to prevent mould development on pods. Groundnut harvesting consists of two operations viz., lifting of vines with pods intact from the soil and separating of pods from the vines. Groundnut vines with intact pods may be lifted from the soil by manual labour or bullock - drawn blade harrows or tractor drawn diggers. Even under ideal conditions of harvesting, however about 5 - 10% of pods are left in the soil. The vines may also be uprooted with a country plough and the vines and pods then picked by manual labour. The pods left over in the soil are also picked by hand.

Groundnut diggers drawn by a pair of bullocks or by a tractor are used in some parts of India. Pods are stripped from the vines by several ways. In bunch types, the plants are stacked in heaps with pod ends exposed to the sun. The pods become brittle within a week's time and they may be stripped by hand. The vines with pods may be lifted out from the soil and dried in the field and the pod ends of the plants may be knocked against a cross bar to separate the pods. In this operation some pods may get damaged, though this is a cheaper method of stripping. A simple comb - type hand stripper and pedal - operated stripper are also available and used for bunch type groundnut where the pods are clustered at the base of the plant.

#### Time of digging

The total pod production increased continuously with growth period, but harvested yield reached a peak and then declined due to field losses at the longer growth period. The percent of total yield lost in the digging and combining operations was relatively constant up to about 145 days below which the percent losses increased rapidly, about 40% of the total yield was lost after 175 days. The physiological maturity indexes adopted to determine the optimum digging time must be employed in conjunction with other considerations during field curing such as general condition of vines, probability of frosts, rains etc., to optimize producer profits. One of the most successfully used methods is based on the change in colour of the inside of the hull. The inside of the hull darkens in colour as the pods mature. As a Thumb rule the optimum time to dig is when about 75% of the pods turn dark in colour. This indicates that a high percent of pods are now mature and field losses are likely to increase faster than new pod development of harvesting is delayed beyond this stage.

#### Cleaning

The harvested stock of Groundnuts contains a variety of extraneous material other than groundnuts, the types and quantities of such foreign material depends upon the adjustment and operation of the harvesting equipment, type and condition of soil and weather conditions.

#### Solar drying

Groundnut drying under the sun, commonly followed in India, solar energy can be collected and stored in water use in heating air for drying Groundnuts. Groundnuts can then be dried in

conventional way using the solar heated air. A solar Groundnut drying system, providing least 50% of the energy required to dry a wagon load of Groundnut to 20 to 10% moisture content on a 3 - day schedule during the harvest. The solar energy systems have been found to be technically feasible for Groundnut curing through their economic feasibility depends on initial and operating costs of the additional equipment required and their potential use for drying other products in addition to Groundnut.

#### Heat pump systems

Drying of Groundnut water heat pump system involves two types of driers. First when the air makes only one pass through the system and the second utilizing a closed air principle. The energy efficiency ratio's for the heat pump systems ranged from 10 to 12, meaning that heating with electrical resistance heaters required 10 to 12 times more energy than the heat pump systems. The quantity of the Groundnut dried using the heat pump systems were comparable to that of other conventional systems. Infrared drying has been evaluated for drying, of groundnuts with different levels of initial moisture content by subjecting them to successive infrared exposures of 0.6 to 1 minute at high initial levels were found to be effective in reducing mould infection, but were extremely detrimental to the quality of groundnuts with respect of germination percentage of sound splits and flavour.

#### Vaccum drying

Vaccum drying of Groundnuts reported is effective to remove moisture rapidly up to 5% per hour. However, the percentage of sound splits was excessive at such high drying rates.

#### Storage

Like most other agriculture crops, groundnuts are semi perishable and their quality during storage can be deteriorated through microbial proliferation, insect and rodent infestation, loss of flavour, viability and rancidity due to biochemical changes as well as absorption of certain odours and chemicals. Although clean and sound groundnuts can be stored for several years under suitable storage conditions, serious losses in milling quality may result when groundnuts are dried below 7% seed moisture content. The studies indicated that the unshelled ground nut in bulk could be stored best at about 7.5% seed moisture content (w.b) at 10°C. At these storage conditions, good quality unshelled

groundnuts can be stored for at least one storage season (about 10 months) without significant loss in quality.

The comparative position of seed standard parameters for major oilseed crops are given below.

Seed Standard

Crop	Moisture % (Maximum)	For all classes of certified seeds		For labelled seeds	
		Physical purity % (minimum)	Germination % (minimum)	Physical purity % (minimum)	Germination % (minimum)
Groundnut	9	96	70	96	70
Sunflower	9	98	60	98	60
Soyabean	12	97	70	97	70

Conversion ratio of Groundnut

- Kernels to nuts in shell : 70%
- Oil to nuts in shell : 28%
- Oil to Kernels crushed : 40%
- Cake to Kernels crushed : 60%

APPENDIX

## Sample Design and Methodology

Multi stage sampling was adopted for the study. The multi stage includes the selection of district/blocks, sample farmers, stratified groups, processors and traders/wholesalers/commission agents. Sarguja district has been selected based on the share in acreage and production under groundnut.

The study was based on a sample of 30 farmers, 2 processors, 6 traders/wholesalers/commission agents. The block-wise distribution of sample farmers is presented in table A.1.

Table A.1 Composition of samples

Sr. No.	Blocks	Number of sample farmers
1	Surajpur	08
2	Sitapur	06
3	Ambikapur	11
4	Baikunthpur	05
	Total	30

## Control samples

As the sample farmers were devoting only a portion of the area to groundnut cultivation, the data/information on other cultivated by these farmers were collected to serve as a comparison of economics of the crop under study vis-a-vis other crops cultivated by the farmers in the area.

## Data

Data for the study was collected from both primary and secondary sources. The data on the socio-economic profile, operational holding, cropping pattern, area under groundnut and its cultivation aspects, source and price of inputs, extension support, credit, marketing, processing and value addition aspects, etc.,

Data on area, production and other non-price related factors were collected from Deptt. of agriculture and other extension departments. Other secondary data regarding area and production at national level, export and import were collected from CMIE and FAO statistics.

### Analysis of data

The discussions in the report are presented block-wise depending upon the blocks where the procurement of produce is taking place, because major focus of the study was effectiveness of supply chain management of groundnut crop.

### Reference year of the study

Data on cultivation, processing and marketing of groundnut were collected from sample farmers, processors and agents for the year 2006-07.

## REPORTS PUBLISHED UNDER THE EVALUATION STUDY SERIES OF NABARD

## A: Reports published by the Head Office of NABARD

Sr. No.	Title of Evaluation Report	Year of publication
1	Minor Irrigation Scheme-Construction of New Wells and Installation of Pump Sets thereon in Solapur District, Maharashtra	1977
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5	Dairy Development Scheme in Jagadhri Block of Ambala District, Haryana	1978
6	Dairy Development Scheme in Mogra Area of Faridkot District, Punjab	1978
7	Poultry Development Scheme in Mulkhapoor, Karimnagar district, Andhra Pradesh	1979
8	Mechanised Fishing Boats in South Kanara District, Karnataka State	1979
9	Development of Acid Lime Garden in Nellore District, Andhra Pradesh	1981
10	Groundwater Irrigation in Kota District, Rajasthan	1982
11	Minor Irrigation in Bhojpur district, Bihar	1982
12	Development of grape cultivation in Bijapur District, Karnataka	1982
13	River Lift Irrigation Scheme in Pune district, Maharashtra	1982
14	Dairy Development Scheme in Western Uttar Pradesh	1982
15	River Lift Irrigation Scheme in Kolhapur district, Maharashtra	1982
16	Sheep Rearing in Nalgonda district of Andhra Pradesh	1982
17	Development of coffee Plantation in Lower Palnia Area, Madurai district, Tamil Nadu	1983
18	Public Tubewells and River Lift in Orissa	1984
19	Power Tillers in Hoogly district, West Bengal	1985
20	Commercial Poultry in Krishna district, Andhra Pradesh	1986
21	Dugwell Irrigation in Palghat district, Kerala	1986
22	Tractors in North Bihar	1986
23	Dairy Development Scheme in Darjeeling district, West Bengal	1987
24	Tractor Schemes in Varanasi, Ghazipur and Jaunpur districts of Eastern Uttar Pradesh	1987
25	Tractors and power tillers in Tamil Nadu	1987
26	Minor Irrigation in Muzaffarnagar district, Uttar Pradesh	1987
27	Dairy Development in Quilon district, Kerala	1987
28	Dugwell Irrigation in Dhenkanal district, Orissa	1988
29	Bamboo and Shallow Tubewells in Purnia district, Bihar	1988

30	Dugwell Water Irrigation Development in Nasik District, Maharashtra	1988
31	Calf Rearing in North Arcot, Salem and Coimbatore district, Tamil Nadu	1988
32	Minor Irrigation in Allahabad district, Uttar Pradesh	1988
33	Coconut Development in Quilon District, Kerala	1988
34	Minor Irrigation in Purulia district, West Bengal	1988
35	Sprinkler Irrigation in Semi-arid Areas of Rajasthan	1989
36	A Scheme of Dugwell Irrigation for small farmers in Amravati district, Maharashtra	1989
37	Marine Fisheries in Coastal Gujarat and Maharashtra	1989
38	Financing of Shallow Tubewells under Massive National Programme in Haryana	1990
39	Financing of Apple Orchards in Hill districts of Uttar Pradesh	1991
40	Work Animals and Animals Driven Carts in Meerut District, Uttar Pradesh	1991
41	Inland Fisheries in Krishna district, Andhra Pradesh	1991
42	Bio-gas plants in Nainital and Rampur districts of Uttar Pradesh	1991
43	Impact of Non-farm sector investments	1994
44	Lift Irrigation Schemes in Maharashtra	1995
45	Mendhwan Watershed Project under IGWDP - Maharashtra State	1999
46	Self Help Groups in Tamil Nadu	2000
47	Micro Finance for Rural People - An Impact Evaluation Study	2000
48	Rural Non-Farm Investments - An Impact Study	2002
49	SHG-Bank Linkage Programme for Rural Poor in India - An Impact Assessment	2002
50	Cold Storages under Capital Investment Subsidy Scheme- An Impact Assessment	2003
51	Infrastructure for Agriculture and Rural Development - An Impact Assessment of Investments in Rural Roads and Bridges under RIDF	2004

B. Reports published by the Regional Offices of NABARD

Sr. No.	Title of Evaluation Report	Year of Publication
Chhattisgarh RO		
1	Evaluation of Minor Irrigation Investments in Chhattisgarh - A Study	2005
2	Impact of RIDF Investments in Chhattisgarh	2006
3	Commodity Specific Study - Groundnut	2007
Gujarat RO		
1	Poultry Development Scheme in Gujarat	1988
2	Dairy Development Scheme in Mehsana District of Gujarat State	1989
3	Lift Irrigation Scheme of Ukar Left Bank Main Canal, Gujarat	1991
4	Financing of tractors in Mehsana and Rajkot district, Gujarat	1992
5	Investment financed under Integrated Rural Development in Valsad district - Gujarat State	1994
6	Market Yard in Jetpur, Rajkot District, Gujrat	2003
7	Marine Fisheries in Junagarh District	2003
Karnataka RO		
1	Development of grape gardens in Bangalore and Kolar district, Karnataka	1989
2	Borewell Financing in Chitradurga and Kolar district, Karnataka	1990
3	Development of Coffee Gardens in Karnataka State	1992
4	Sericulture Development in Karnataka - Farm investments	1993
5	Lift Irrigation Schemes in Belgaum District, Karnataka	2000
6	Poultry (Broiler) Development in Bangalore (Rural) and Bangalore (Urban), Karnataka	2001
7	Drip Irrigation Programme in Chitradurga District of Karnataka	2001
8	Dairy Development in Kolar and Shimoga Districts of Karnataka	2002
9	Sericulture in Kolar and Tumkur districts of Karnataka	2003
10	Fuelwood Development Project in Karnataka	2003
11	Participatory Irrigation Management Institutions in Karnataka	2004
12	Gherkins-AEZ, Karnataka - A Commodity - Specific Study	2005
Madhya Pradesh RO		
1	Dugwell and shallow Tubewell Irrigation in Narsinghpur district, Madhya Pradesh	1990
2	Tractor Financing in Raisen and Vidisha district, Madhya Pradesh	1992
3	Commercial Layer Poultry Development Programme in Sagar district in Madhya Pradesh	1994
4	Integrated Rural Development Programme in Sagar district in Madhya Pradesh	1994

5	Rural Non-Farm Sector in Ujjain District	2005
Orisa RO		
1	Betelvine Gardens in Puri district, Orissa	1989
2	Tractor in Sambalpur district	1989
3	Dairy Development Schemes in Cuttack and Ganjam district	1992
4	Brackish Water Prawn Culture in Puri district	1994
5	Minor Irrigation in Sambalpur district	1997
6	Shallow Tubewells in Undivided Cuttak and Puri Districts, Orissa	2000
7	District Rural Industries Project (DRIP) and PLI Training Programme	2002
8	Group Financing under Farm Mechanisation in Orissa	2003
Punjab & Haryana RO		
1	Poultry farming in Punjab	1987
2	Dairy Development Schemes in Karnal and Rohtak district of Haryana	1987
3	Tractorisation in Haryana	1994
4	Grapes gardens in Hissar district of Haryana	1998
5	Inland Fisheries in Patiala & Bhatinda districts	1998
6	Financial viability of tractors in Punjab	2000
7	Non-Farm Sector in Ludhiana and Sangrur Districts of Punjab	2001
8	Water Conveyance System in Rewari and Mahendragarh Districts	2001
9	Cold Storages in Jalandhar, Ludhiana and Patiala Districts of Punjab	2001
10	Daiory Financing in Kurukshetra and Kaithal Districts of Haryana	2002
11	Self Help Groups in Karnal, Gurgaon and Bhiwani District of Haryana	2002
12	Poultry (Layers) in Sangrur and Gurdaspur Districts in Punjab	2003
13	Financing of Tubewells in Bhatinda, Hoshiarpur and Ropar Districts	2003
14	Agro and Food processing units in Haryana	2003
15	Roads in Muktasar District in Punjab	2003
16	Financing of Dairy (Buffaloes) in Patiala and Sangrur Districts	2004
17	Tractor Financing in Kaithal and Fridabad Districts	2005
Tamil Nadu RO		
1	Poultry Development in Salem district of Tamil Nadu	1988
2	Dugwell Irrigation in Pudukkottal and North Arcot district Tamil Nadu	1989
3	Tea Garden in the Nilgiris district	1990
4	Minor Irrigation Investment under Massive Assistance Programme in South Arcot and Tiruchirappalli district	1991
5	Jasmine investment in Salem and Madurai district of Tamil Nadu	1992
6	Mini Dairy Investments in Coimbatore & Periyar district	1994
7	Marine Fisheries in Tamil Nadu	1998

8	Sericulture in Tamil Nadu	1999
9	IRDP in Tamil Nadu	2000
10	Modern Rice Mills in Tamil Nadu	2001
11	Coconut Development in Coimbatore District of Tamil Nadu	2002
12	Minor Irrigation Credit Programme in Rmnad and Trichy Districts	2002
13	District Rural Industries Project in Tirunelveli District	2003
14	Cold Storages in Tamil Nadu	2003
15	Combine Hrvestors in Tiruvallur andSalem Districts	2005
Assam RO		
1	Private shallow Tubewells and lift points in Assam	1989
2	Inland Fishery in West Tripura district	1992
3	IRDP in Ngaon Distrit, Assam	2000
4	Farm Mechanisation (Power Tillers) in Sibsagar District, Assam	2000
Andhra Pradesh RO		
1	Public Tubewells in Khammam district	1988
2	Development of grape gardens in Rangareddy district	1989
3	Dugwell irrigation in Chittoor district	1989
4	Mango orchards in Krishna and Khammam district	1991
5	On farm development in Khammam and Krishna district	1995
6	Inland Fisheries in West Godavari district	1996
7	Dairy Development in Krishna, District Andhra Pradesh	1999
8	Poultry Layer Investment, Andhra Pradesh	2000
9	Food (Mango) Processing in Visakhapatnam and Chittoor Districts	2001
10	Sheep Rearing in Mahbubnagar and West Godawari Dsitriacts	2002
11	An Ex-post Evaluation Study on Sericulture Investments in AP	2002
12	Rural Non-Farm Sector in Andhra Pradesh	2005
13	Commodity - Specific Study - 1 - Grape	2004
14	Commodity -Specific Study - 2- Cotton	2005
Rajasthan RO		
1	Minor Irrigation structure in Kherwara, P.S.Udaipur district, Rajasthan	1988
2	Tractors in Alwar district	1991
3	Market Yard in Kekri, Ajmer district	1991
4	Borewell in Jodhpur district	1993
5	Ex-post evaluation of IRDP in Alwar district	
6	Ex-post evaluation study of poultry development in Ajmer district	1995
7	An ex-post evaluation study of sprinkler irrigation schemes in Barmer districts	199
8	Ex-post evaluation of dairy schemes in Bharatpur district	1999
9	An evaluation of water management schemes in Jaipur district	2001
10	Minor Irrigation Schemes in Bikaner District of Rajasthan	2001
11	Orange Cultivation Schemes in Jhalawar District of Rajasthan	2002

J & K RO		
1	IRDP in Baramulla district	1993
2	Ex-post evaluation study of tractor financing in Jammu division	1995
West Bengal RO		
1	Inland Fisheries Schemes In Nadia district	1987
2	Betelvine Ganges in Midnapur district	1989
3	Bullock and bullock carts in Mandla districts	1991
4	Poultry Farming (Broilior) in Medinipur District, West Bengal	1999
5	Minor Irrigation Schemes in Birbhum District, West Bengal	2000
6	Floriculture in Midnapore District of West Bengal	2002
7	Modern Rice Mills and Mustard Oil 'Ghani" Mills in Bankura District	2003
8	Special Component Plan and Tribal Sub-Plan - An Impact Assessment	2004
Uttar Pradesh RO		
1	Evaluation of Minor Irrigation schemes in Jhansi district	1988
2	Tractor in Western UttarPradesh	1992
3	Inland fishery schemes in Azamgarh and Deoria districts	1994
4	NFS in Moradabad district	1995
5	Sangham Mini Dairy, Allahabad	1997
6	Mushroom in Dehradun district	1997
7	Ex-post evaluation of grapes in Muzzafarpur district	1998
8	Minor Irrigation in Raibareli district	1998
Bihar RO		
1	Shallow Tubewells in Durbhanga, Madhubani and Samastipur districts	1988
2	Deep Tubewells in Bihar	1989
3	Dairy development schemes in Baguasarai and Singhbhum districts	1989
4	Minor Irrigation Schemes in Samastipur district	1996
5	IRDP in Ranchi District in Bihar	1997
6	Cold Storages in Bihar	2004
Maharashtra RO		
1	Lift Irrigation Schemes in Ahmednagar district	1988
2	Well Irrigation in Aurangabad district	1991
3	Poultry development in Pune district	1991
4	Grape Gardens in Nasik district	1993
5	Land Development in Command of Kukkadi project	1995
6	IRDP in Yavatmal District	1998
7	Farm Mechanisation in Ahmednagar District of Maharashtra	1999
8	Post Harvest Centres (Pre-Cooling, etc.) for export of Grapes	2001
9	Rice Mills in Maharashtra	2002
10	Cold Storages in Maharashtra	2004
Himachal Pradesh		
1	Dairy Development in Mandi District, Himachal Pradesh	1997

2	Apple Cultivation in Himachal Pradesh	2004
Kerala RO		
1	Betelvine Gardens in Trivendrum district	1988
2	Broiler Poultry Development in Ernakulam district	1990
3	Development of Rubber Plantation in Kottayam district of Kerala	1990
4	Fisheries Development in Kollam district	1992
5	Farm Mechanisation in Palakkad & Ernakulam districts	1995
6	Rural Non-Farm Sector in Malappuram and Kozhikode Districts, Kerala	1998
7	Sprinkler Irrigation in Kasargod District of Kerala	2002
8	Dairy Development in Kollam District of Kerala	2002
9	Minor Irrigation in Kasaragod and Kannur District of Kerala	2003
10	Rural Non-Farm Sector in Kollam and Alapuzza Districts	2004
11	SHGs in Wayanad District	2004

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