सामयिक निबन्ध - 51
Occasional Paper - 51

भारत में दलहन उत्पादन एवं प्रसंस्करण का अर्थशास्त्र

Economics of Pulses Production and Processing of India

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National Bank for Agriculture and Rural Development
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लेखक

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Foreword

Pulses or dals contain rich and cheap sources of protein for human consumption. In India, a large proportion of the Indian population is vegetarian and pulses form the main source of vegetable protein. However, the per capita consumption of pluses has declined from 69 grams/day in 1960-61 to 36 grams/day in 2007-08. For India, the World Health Organization recommends a minimum consumption of 80 grams of pulses / capita /day. Despite this, India is the largest producer of pulses in the World representing 25 per cent of total production (61.34 million tonnes), 30 per cent of total consumption and 33 per cent of global acreage (73.33 million hectares) under pulses. Productivity of pulses in India has been very low at 622 kg/ ha, when compared to 1908 kg/ha in Canada / USA.

There was a global shortage in pigeon pea /tur production, resulting in soaring prices. Prices of Arhar/tur dal had increased nearly fourfold during the last five years (2005-09). Price of tur dal, which was Rs 24-32/kg during 2005, had increased to Rs 100/kg in December 2009. Demand has been growing with increase in population as well as the rising purchasing power of the rural people due to NREGS, ADWDR, etc. Production and availability of pulses are not keeping pace with each other. Due to sharp rise in tur dal price, consumers are moving to a lower grade of tur dal and are also switching to cheaper pulses like matar/vatana or chana.

The present study is a compilation of Commodity study reports in five States namely Odisha, Andhra Pradesh, Uttar Pradesh, Haryana and Karnataka, conducted by Agricultural Economists posted in the respective Regional Offices. The findings are based on data collected in the designed schedule/ questionnaires from 285 farmers, 39 processing units and 57 traders and a few commission agents spread over in five States. The study revealed that area under pulses production is more or less static at 23 million hectares during 1955-2007 and productivity was low at 622 kg/hectare. The major reasons for low yield / ha are attributed to lack of high yielding and short duration varieties, inadequate irrigation, cultivation in inferior lands, absence of fertilizer use , frequent attack of pest and diseases, dearth of extension services and poor infrastructure and slow transfer of technology. The processing units are faced with problems of low recovery, (5- 20 per cent), sun drying, distress sale, lack of standardization, dearth of market information, absence of brand product.

The sample farmers cultivating tur in Andhra Pradesh accrued highest net income of Rs 10,913 per acre followed by Karnataka (Rs 6,495) and UP (Rs 5,706). In respect of chana, Andhra Pradesh earned a net income per acre of Rs 16,075, while it was Rs 2,136 in Karnataka and Rs 1,282 in Haryana. Per acre net income of urad in Karnataka was Rs 8,163 while it was Rs 7,824 in Andhra Pradesh. Mung in Karnataka earned Rs 4,169 per acre followed by Odisha (Rs 882).

The sample data revealed that total processing cost and sales proceeds for milling one MT of pulses has been arrived at Rs 23,586 and Rs 26,400 respectively. The net value addition per one MT of raw pulses has been Rs 1,702, which constituted 7 per cent of the operating cost. The input output ratio has been calculated at 1:1.06. The sample dal processing units could break even on an average production of 1648 MT of raw pulses in 1030 days. As the unit operates on an average for 210 days in a year, the units can break even only in the fourth year. The sample dal processing units were utilizing 60-65 per cent of their installed capacity during the first and second years and 70 per cent from the third year onwards. The financial rate of return of the processing unit is 25 per cent.

The study recommends that to enhance pulse production, necessary steps may be taken to cultivate pulses in rice fallows, introduce inter cropping, prevent post- harvest losses, use HYV seeds and supply quality seeds, adopt recommended doses of fertilizers and pesticides, establish seed bank, extend capacity building, set up Farmers Clubs for technology transfer, launch Bt pulses etc.. To add value to the pulses, the processing units need to be well equipped so as to meet consumer demand. Thus, the study recommends supply of good quality raw materials, adoption of conditioning techniques to loosen the husk without resorting to sun drying, extension of storage facility and infrastructure support, introduction of market reforms, establishment of e- mandis etc.

There is need for a break through in seeds production so as to improve productivity and our seed scientists need to achieve necessary break-through in pulses seed technology.

I hope the study findings will be useful to academicians, planners, policy makers, pulse growing farmers and all those who are involved in production, processing, marketing, and trade of pulses.

Dr. K.G. Karmakar
Managing Director
NABARD

Mumbai
23 February 2010

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The study is based on Commodity Study Reports of five States namely Odisha, Andhra Pradesh, Uttar Pradesh, Haryana, and Karnataka. The Agricultural Economists posted in the respective Regional Offices conducted the studies. We are grateful to the authors Smt. Smita Mohanty, Assistant General Manager, Shri A K Sarkar, Assistant General Manager, B V S Prasad, Assistant General Manager, Dr. K U Viswanathan, Assistant General Manager and Dr. Ashutosh Kumar, Manager, for their reports.

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Authors

Abbreviations

ADWDR	:	Agriculture Debt Waiver and Debt Relief Scheme
ASEAN	:	Association of South East Asian Nations
CACP	:	Commission for Agricultural Costs & Prices
CFTRI	:	Central Food Technological Research Institute
FAO	:	Food and Agriculture Organization
FTA	:	Free Trade Agreement
FTTF	:	Farmers Technology Transfer Fund
Ha	:	Hectare
IIPR	:	Indian Institute of Pulses Research
Kg	:	Kilograms
Qtl	:	Quintal
MOA	:	Ministry of Agriculture
MSP	:	Minimum Support Price
MT	:	Metric Tonne
NABARD	:	National Bank for Agriculture and Rural Development
NAFED	:	National Agricultural Cooperative Marketing Federation
NREGS	:	National Rural Employment Guarantee Scheme
WHO	:	World Health Organization

TABLES

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MAJOR FINDINGS

During last two decades the average growth rate of pulses was 1.39 per cent where as the growth rate of population was 1.80 per cent. As a result there is mismatch between the two. The per capita domestic production / availability of pluses has declined from **69 grams/day in 1960-61** to 51 grams/day in 1970-71, 42 grams/day in 1990-91 and **36 grams/day in 2007-08.**

In fact, prices hiked on an average annual basis by 6.3 per cent for chana, 6.1 per cent for tur, 6.5 per cent for mung and 8.6 per cent for urad. Given erratic production trends, prices have been declining in one year and rising the next year.

When prices are rising, it is logical that there is an incentive for farmers to produce more of these crops to earn higher incomes. However, this has not happened due to various internal and external factors. There has been a problem with pulses production.

Productivity of pulses in India has been stagnated at **622 kg/ha,** compared to yield of 1908 kg/ha in Canada / USA due to affected by the vagaries of monsoon, problem of quality and approved HYV seeds, low seed replacement rate, etc.

Some of the reasons for low productivity of pulses are attributed to cultivation of crops in enormous moisture stress areas and marginal and sub marginal lands (inferior lands) in terms of soil quality, lack of irrigation,etc. **Pulses are energy rich crops but are cultivated largely under conditions of energy starvation.**

Adverse weather conditions such as erratic and untimely rainfall, high humidity, cloudy weather at flowering stage, temperature variations and moisture stress at various levels together with continuous attack of pests and insects affect the productivity.

Lack/non availability of high yielding and short duration varieties of pulses resulted in poor yield. Farmers were using local varieties of seeds, mostly their own. These seeds were used over a longer period and their productivity was lesser in comparison to the improved/new seeds.

Although Tur Dal Board recommends seed replacement in every 3 years, farmers continue to use seeds grown in the farm year after year.

Most farmers prefer to use their own seeds, **seed replacement rate was low.**

The sample farmers cultivating Tur in Andhra Pradesh accrued highest net income of Rs 10913 per acre followed by Karnataka (Rs 6,495) and Uttar Pradesh (Rs 5,706). In respect of Chana, Andhra Pradesh earned net income of Rs 16,075, while it was Rs 2,136 in Karnataka and Rs 1,282 in Haryana. Per acre net income of Urad in Karnataka was Rs 8,163 where as it was Rs 7,824 in Andhra Pradesh. Mung in Karnataka earned Rs 4,169 per acre followed by Odisha (Rs 882).

The sample data revealed that total processing cost and sales proceeds for milling one MT of pulses has been arrived at Rs 23,586 and Rs 26,400 respectively. The net value addition per one MT of raw pulses has been Rs 1,702, which was around 7 per cent of the operating cost. The input output ratio has been calculated at 1:1.06. The sample dal processing units could break even by processing on an average 1,648 MT of raw pulses in 1,030 days. Since the unit operates on an average for 210 days in a year, the unit can break only in the Fourth Year.

The sample dal processing units were utilizing 60-65 per cent of their installed capacity during the first and second years and 70 per cent from third year on words.

The sample farmers were very seldom following the exact and systematic package of recommended practices such as weeding, application of pesticide, use of fertilizer etc . All these contributed to low productivity.

The Indian Institute of Pulses Research, Kanpur has been carrying out pioneering research in the field of pulses. However, the lab to land transfer of technology has been slow. The sample farmers reported that the new **technologies have not reached the farmers in a meaningful way.**

Although several promotional strategies such as National Pulses Development Program (NPDP), National Food Security Mission (NFSM), Integrated Scheme of Oilseeds, Pulses, Oil palm and Maize (ISOPOM) have been introduced to increase the production of pulses since the Third Five Year Plan, there is hardly any break through in the production of pulses. The field study observed that **Pulses are still relegated to an inferior crop.**

Introduction of "The New Agricultural Technology (NAT)" during the mid sixties and adoption of various measures from Third to Eleven Five Year Plans did not make uniform impact on all the crops. Production of rice and wheat increased substantially, while it was almost stagnant in case of pulses.

India's per capita domestic consumption had declined from 69 gram/ day in 1960-61 to 29 gram /day in 2006-07. For India, the World Health Organization (WHO) recommends a minimum of 80 grams of pulses/capita/day.

The yield of dehusked and split pulses was around **75-80 per cent** in comparison to 88-89 per cent. Thus, there was loss of pulse cotyledons and embryos in the form of brokens and powdered grains to the extent of 5-15 per cent.

The average capacity utilization of the processing units was 70 per cent because of non-availability of pulses. Further, pulses processing is a seasonal activity. Resorting to imports will help the processing units to make continuous operations round the year.

The pulse milling is almost an exclusive industry in the Indian sub-continent, but it has not received the necessary scientific and technological support like other food processing industries such as rice and wheat milling.

The pulse milling is an old practice. Hardly technical improvements in the process have been observed for decades. The major problems of present day units are low recovery and high cost of milling. To avoid such problem in India, **modern sophisticated high tech technology** for processing units is required so that India can compete with major competitors viz Canada, Australia, Germany and Spain.

Sample units were using batch process of Pulses. It involves excessive material handling resulting in pulse loss. The units were preparing a lot of 50-60 quintals of pretreated/ conditioned pulses at a time for milling. After producing dal, the same process was repeated.

The sample units were using sun drying which reduces the capacity utilization of the units during rainy season.

As the pulses are aggregated from **large number of players, they differ in their quality, variety and size.** There is no mechanism to grade and standardize pulses, leading to under recovery.

Lack of infrastructure like uninterrupted supply of electricity, water etc is one of constraints faced by the processing units.

Majority of the pulse growers preferred to sell the produce after the harvest to meet the pressing needs. The prices were low immediately after the harvest and generally pick up after some times. The farmers get only a fraction of this for his produce. Due to lack of **information on the prevailing trend in production, prices etc the farmers sold their produce at a much lower price.**

Due to inadequate transport facilities at the villages, the farmers sold the pulses to the traders directly from their farm or at villages, which offered the lesser price than prevailing at the nearby/district markets.

Like other branded products such as basmati rice, edible oils, except besan **no branded product** of any pulse is popular at present.

There is sharp rise in prices of pulses. Prices of Arhar/Tur dal had increased nearly **fourfold during the last 5 years (2005-2009).** Price of tur dal which was Rs 24-32 / kg during 2005, had increased to Rs 100 / kg in December 2009. Due to this, sales of pulses have been sluggish in terms of volume. There was 70 per cent drop in pulses demand.

The gap between supply (production) and demand (consumption) of pulses leads to hike in prices. Due to sharp rise in tur dal price consumers are moving to a **lower grade** of dal **like matar/vatana or chana.**

The protein content in pulses is about 18-25 per cent. This makes pulses one of the cheap sources of protein for human consumption. Thus, pulses are called poor mans meat.

The production of pulses in the largest producing nations dips. The global markets are unable to fill up the gap between supply and demand, leading to abnormal price rise. Imports may be one of the options for the short run.

Policies

Production may be increased by (i) cultivating rice fallows, (ii) growing short duration varieties (iii) inter cropping, (iv) preventing /minimizing post harvest losses, and (v) storing pulses at optimum humidity conditions.

The common variety of seeds supplied by the institutional sources sometimes proved to be less productive and more susceptible to attack of pests and diseases and low germination. The soil qualities vary from place to place. There comes the need for the development and distribution of specific variety of seeds for specific areas.

The development and distribution of seeds suitable for local conditions through the seed village programs will go a long way in solving the problem.

The IIPR, Kanpur is of the opinion that the available technology has the potential to double the present level of productivity provided the technology gap between lab and land is reduced. Farmers Technology Transfer Fund (FTTF) operationalised by NABARD for promoting transfer of technology for enhancing production and productivity in agriculture and farm related activities can be used for the purpose.

Currently 15 per cent of the total area under pluses is irrigated as compared to 46 per cent for all food grains. It is essential to go for sprinkler irrigation for increasing pulses production.

The uninterrupted supply of raw material is a prerequisite for running any unit. Unless resorted to imports, the available production is not adequate for domestic market and for processing to make continuous operations round the year. Hence efforts should be made from all sides for ensuring supply of raw material throughout the year.

The present losses being encountered by the milling industry can be minimized to a great extent by the use of improved dal mills. The improved dal mills have dehusking efficiency of about 95 per cent and the yield of split pulses is about 80 to 85 per cent .

Direct marketing of produce by the farmers / sellers to millers could economize the transportation cost and improve the price realization. Direct marketing by farmers to the consumers/millers has been experimented through Apni Mandi in Punjab and Haryana. The concept was introduced in Andhra Pradesh through Rythu Bazars. These markets at present are run through the assistance of the Govt. as promotional ventures.

CHAPTER 1

An Over View of Pulses

Definition

The Food and Agriculture Organization (FAO) of United Nations defines pulses as an annual leguminous crop yielding from one to twelve seeds within the pod and harvested for dried seeds.

Classification of Pulses

According to FAO classification, there are 11 primary pulses/pulse groups. They include (i) dry beans which cover kidney bean, lima bean, adzuki bean, mung bean, urad bean, scarlet runner bean, moth bean, leper bean, (ii) dry broad beans consisting of horse bean, broad bean, field bean, (iii) dry peas covering garden pea, protein pea, (iv) chickpea/ Bengal gram /chana/gram, (v) pigeon pea/tur/ arhar, (vi) lentil/ masur, (vii) dry cowpea, (viii) earth pea, (ix) vetch, (x) lupines and (xi) minor pulses like lablab, hyacinth bean, jack bean, winged bean, velvet bean , yam bean. The report uses Indian name/s of pulse.

Area, Production and Yield of Pulses in Major Countries of the World

Pulses are grown in an area of 73.33 million ha with a production of 61.34 million tons in World. The area, production and yield of pulses in major countries of the world in 2007 are presented in table 1.1.

Next to India, Niger, Nigeria, Brazil, China, Myanmar, and Canada are the leading countries in area under pulses. The leading producers next to India are China, Canada, Brazil, Nigeria, Myanmar and USA. While the world average yield stood at 836 kgs / ha, USA , Canada and China attained yields of 1,908 kgs / ha, 1,804 kgs /ha and 1,752 kgs /ha respectively. The yield in India at 622 kg/ha was far below the world average as also of other leading producing countries. (table1.1).

Table 1.1Area, production and yield of pulses in major countries of the world during 2007

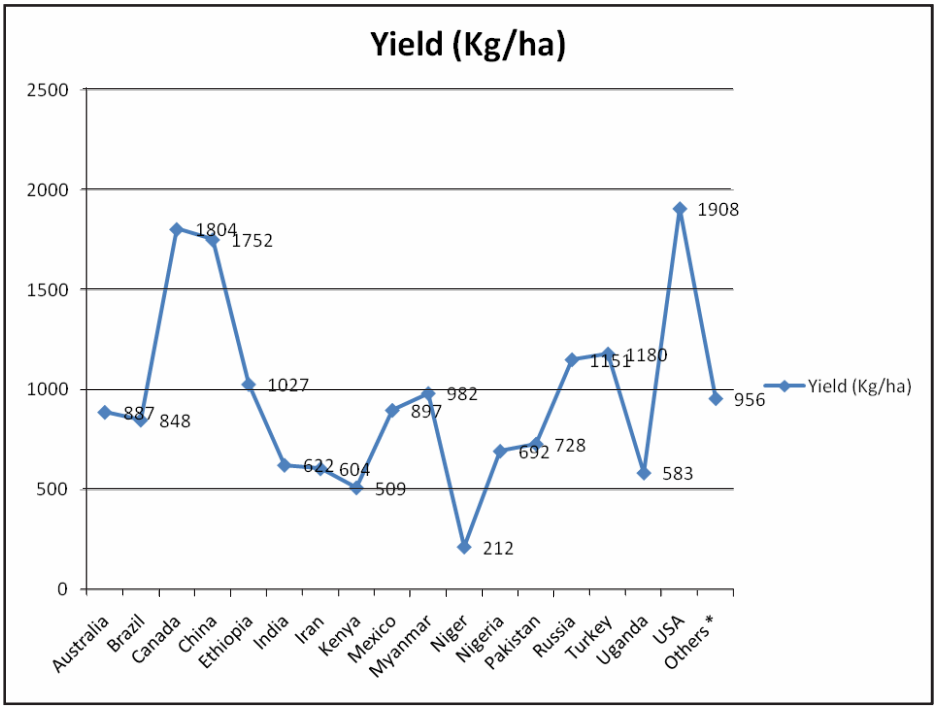
SN	Country	Area (Ha)	% to total	Production (Tons)	% to total	Yield (Kg/ha)
1	Australia	1371000	1.87	1216000	1.98	887
2	Brazil	3947467	5.38	3347435	5.46	848
3	Canada	2313800	3.12	4175000	6.81	1804
4	China	3537200	4.82	6197500	10.10	1752
5	Ethiopia	1281000	1.75	1315000	2.14	1027
6	**India**	**23315000**	**31.79**	**14500000**	**23.64**	**622**
7	Iran	1766000	2.41	1066000	1.74	604
8	Kenya	1447450	1.97	736555	1.20	509
9	Mexico	1882750	2.57	1688602	2.75	897
10	Myanmar	2753500	3.75	2704300	4.41	982
11	Niger	4821948	6.57	1023309	1.67	212
12	Nigeria	4630000	6.31	3203000	5.22	692
13	Pakistan	1632300	2.23	1189100	1.94	728
14	Russia	1130300	1.54	1300940	2.12	1151
15	Turkey	1265000	1.72	1493073	2.43	1180
16	Uganda	1061300	1.45	618300	1.01	583
17	USA	1113111	1.52	2123739	3.46	1908
18	Others *	14064980	19.18	13443597	21.92	956
	World	**73334106**	**100**	**61341450**	**100**	**836**

* Others include: France, Ukraine, Egypt, Argentina, Bangladesh, Indonesia, Japan, Thailand, Spain and Italy.

Note-world total may not tally as many countries are not included

Source: FAO Production Year Book, Rome

Fig.1: Yield of pulses in major producing countries of the world

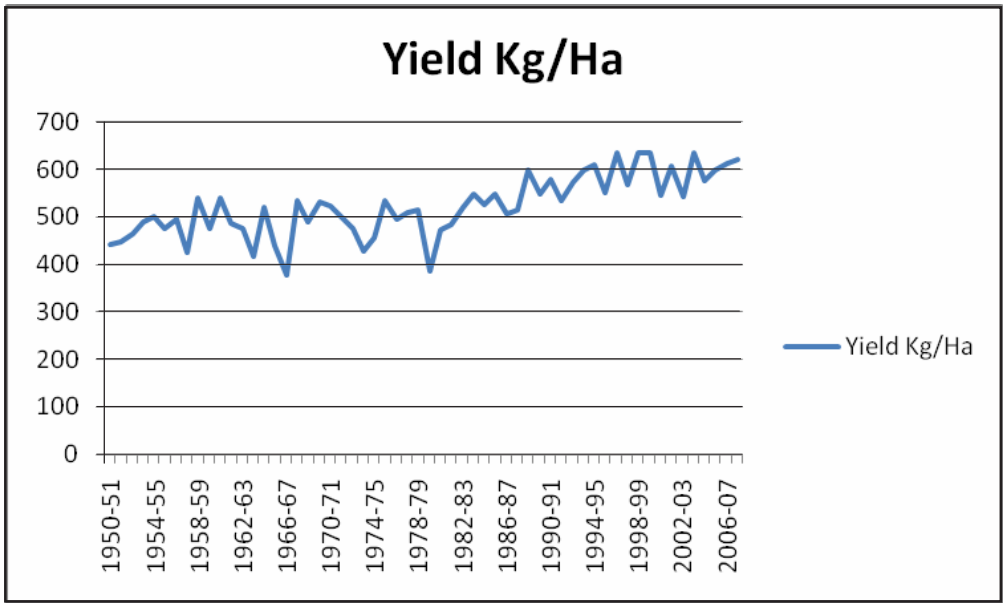


Area, Production and Yield of Pulses in India

In 2007 India owned 23.31million ha under pulses accounting for 31.79 per cent of the world area with a total production of 14.50 million tons constitute 23.64 per cent of world production. The pulse output is stagnant at 14-15 million tonnes. Area, production and productivity of pulses in India during 1950-51 to 2007-08 are given in **Annexure-1**.

Lowest area of 18.78 million ha. was under pulses during 1951-52 and highest 24.83 million ha. during 1959-60. Production of pulses was minimum at 8.35 million tons during 1966-67 and maximum at 15.12 million tons during 2007-08. Lowest yield recorded at 377 kg/ ha during 1966-67 and highest 635 kg/ha in three years namely in 1996-97, 1999-00 and 2003-04. As regards percentage of irrigation covered under pulses, it was observed that lowest area devoted for irrigation was to the extent of 7.1 per cent during 1977-78 and highest at15 per cent was during 2005-06. (Annexure 1)

Fig. 2 : Yield of Pulses during 1950-51 to 2006-07 in India



Area and Production of Pulses vis-a- vis Food Grains in India

The area and production of pulses in India vis-a- vis the overall food grains during 1960-61 to 2006-07 is shown in table 1.2.

Table 1.2 Area and production of pulses and food grains in India during1960-61 to 2006-07

(Area in Million ha. and Production in Million Tons)

Year	Area		Production	
	Food grains	Pulses	Food grains	Pulses
1960-61	115.6	23.6 (20)	82.5	12.7 (15)
1970-71	124.3	22.54 (18)	108.4	11.82 (11)
1980-81	126.7	22.46 (18)	129.6	10.63 (8)
1990-91	127.8	24.66 (19)	176.4	14.26(8)
2000-01	121.0	20.35 (17)	196.8	11.08 (6)
2001-02	122.8	22.01 (18)	212.9	13.37 (6)
2002-03	113.9	20.50(17)	174.8	11.13 (6)
2003-04	123.4	23.46 (19)	213.2	14.91 (7)
2004-05	120.1	22.76 (19)	198.4	13.13 (7)
2005-06	121.6	22.39 (18)	208.6	13.39 (6)
2006-07	123.5	23.19 (19)	216.1	14.20 (7)

Figures in the parentheses indicate percentage of pulses to food grains

Source: Economic survey, GoI, 2007-2008

Area under pulses as a percentage of area covered under food grains varied from 17 to 20 per cent over the years , while production ranged from 6 to 15 per cent .Most interestingly, share of pulses production compared to food grain production started declining from 11 per cent in 1970-71 to7 per cent in 2000-01 to 2002-03 and in 2005-06.

Fig.3 : Area and production of food grains during 1960-61 to 2006-07

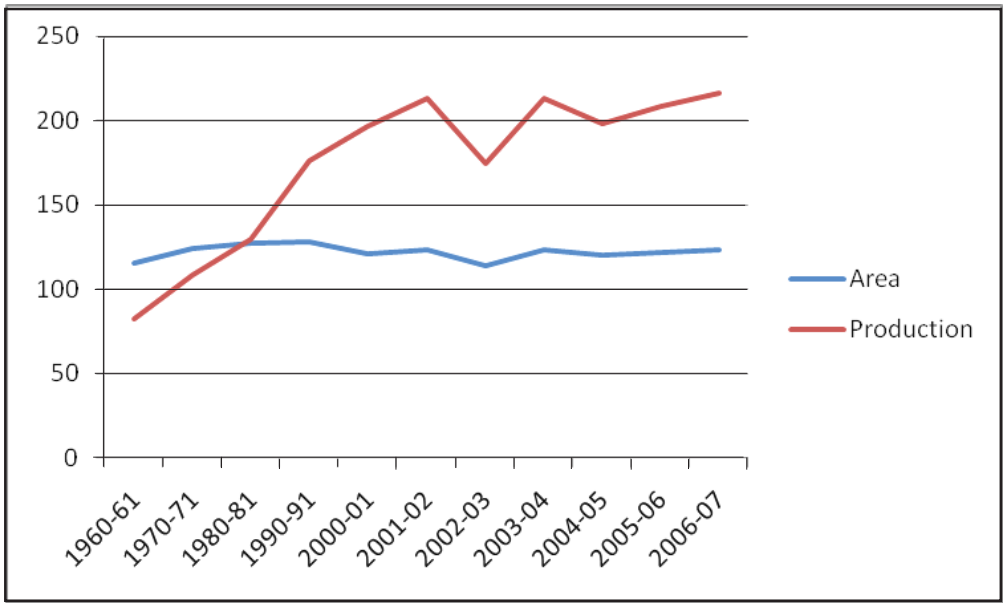
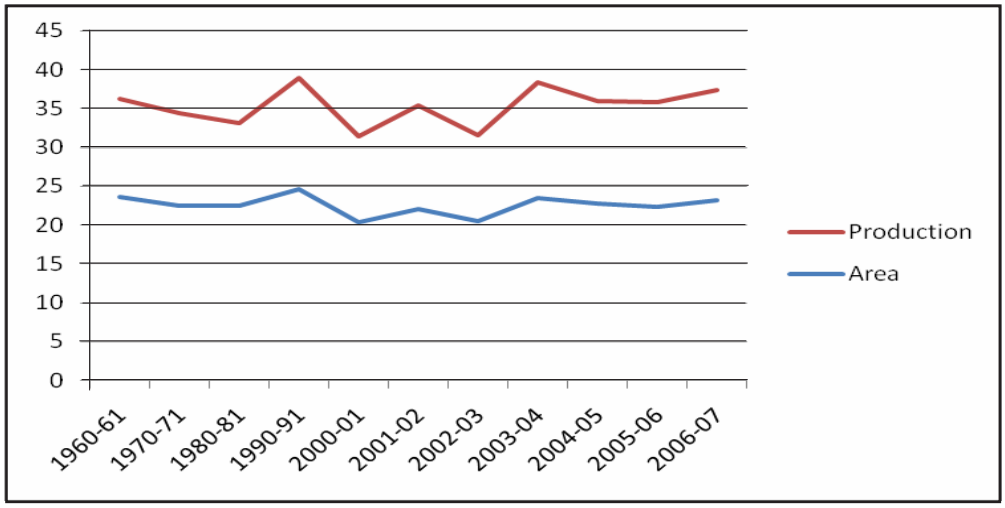


Fig.4 : Area and production of Pulses during 1960-61 to 2006-07



Productivity of Pulses vis -a -vis Food Grains

Productivity of pulses vis-à-vis food grains during 1960-1 to 2006-07 is indicated in table 1.3.

Table 1.3 Productivity of pulses vis -a- vis food grains during 1960-61 to 2006-07

(kg/ha)

Year	Food grains	Index (Base 1960-61)	Pulses	Index (Base 1960-61)
1960-61	710	100	539	100
1970-71	842	119	524	97
1980-81	1023	144	473	88
1990-91	1380	194	578	107
2000-01	1626	229	544	101
2001-02	1734	244	607	113
2002-03	1535	216	543	101
2003-04	1727	243	635	118
2004-05	1652	233	577	107
2005-06	1715	242	598	111
2006-07	1750	246	612	114

Source : Directorate of Economics and Statistics, Dept. of Agriculture and Cooperation, Ministry of Agriculture, GoI.

Productivity of food grains increased by 146 per cent compared to pulses by 14 per cent during 1960-61 to 2006-07. Table 1.3 exhibited indices of food grains and pulses. This reflects the fact that Indian pulses sector has a long way to go in terms of productivity.

Share of Irrigated Area under Pulses vis –a- vis Food grains and Cereals

The low productivity of the pulses can be explained better in terms of its low irrigation coverage. The table 1.4 shows the irrigated area under pulses vis-a vis that of total food grains and cereals.

Fig.5: Productivity of foodgrains and pulses during 1960-61 to 2006-07

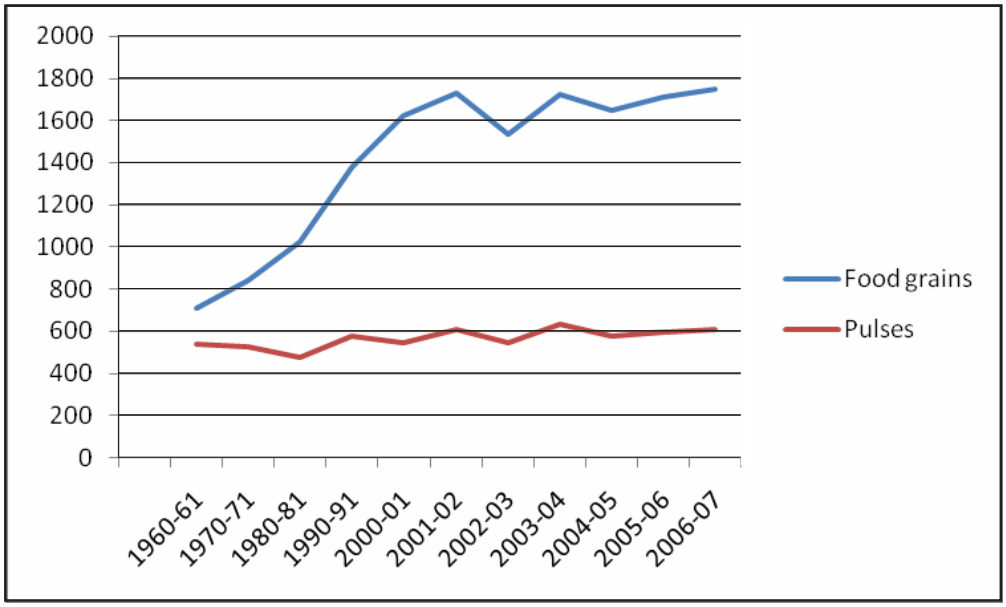


Table 1.4 Share of irrigated area under cereals, pulses and food grains during 1970-71 to 2005-06

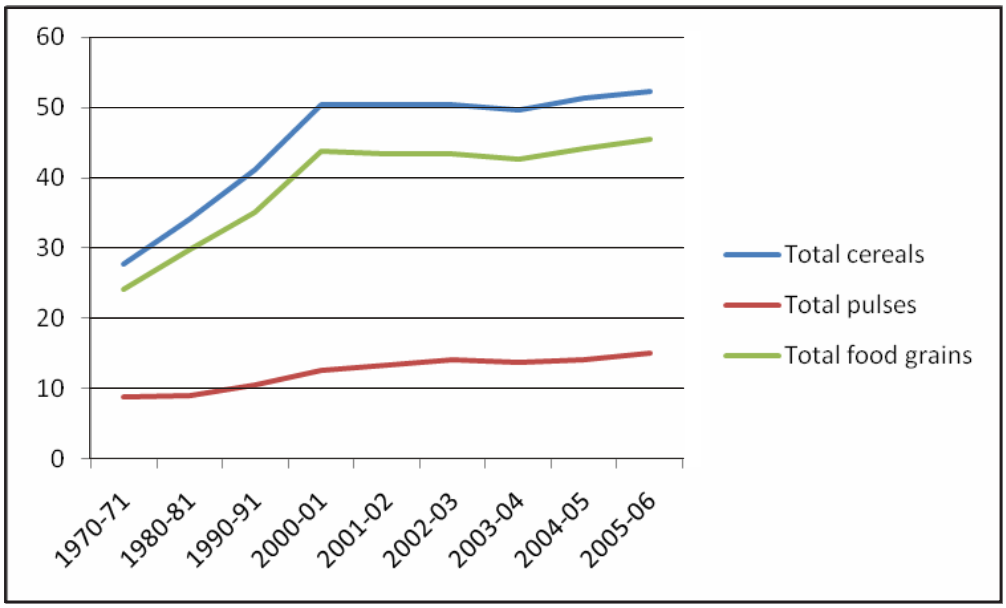
(in %)

Year	Total cereals	Total pulses	Total food grains
1970-71	27.6	8.8	24.1
1980-81	34.1	9.0	29.7
1990-91	41.0	10.5	35.1
2000-01	50.4	12.5	43.8
2001-02	50.4	13.4	43.5
2002-03	50.4	14.1	43.4
2003-04	49.7	13.7	42.6
2004-05	51.4	14.0	44.1
2005-06	52.3	15.0	45.5

Source: Directorate of Economics and Statistics, Dept. of Agriculture and Cooperation, Ministry of Agriculture, GoI.

The percentage of irrigated area to the total area under pulses went up from 8.8 per cent during 1970-71 to 15 per cent during 2005-06, while it was 27.6 per cent to 52.3 per cent for cereals and 24.1 per cent to 45.5 per cent for total food grains. This reiterates the fact that **pulses are cultivated mainly in the rain-fed areas.**

Fig.6 : Share of irrigated area under cereals, pulses and food grains during 1970-71 to 2005-06



Area Covered under Major Varieties of Pulses in India

The major pulses cultivated in India include (a) Mung, (b) Urad, (c) Tur/Arhar, (d) Chana/gram, and (e) Masur/lentils. The area under the major pulses during 2000-01 to 2005-06 is indicated in table 1.5.

Table 1.5 Area under the major pulses during 2000-01 to 2005-06

(lakh ha)

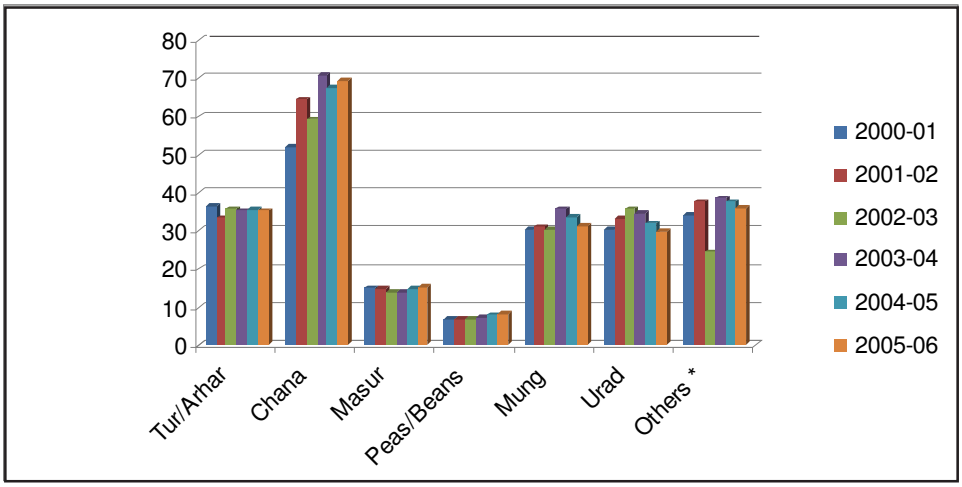
Pulse	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06
Tur/Arhar	36.32	33.28	35.59	35.16	35.19	35.09
Chana	51.85	64.16	59.06	70.48	67.15	69.26
Masur	14.78	14.66	13.77	13.69	14.73	15.05
Peas/Beans	6.55	6.7	6.64	7.09	7.91	7.93
Mung	30.08	30.87	30.15	35.48	33.41	31.09
Urad	30.11	33.03	35.5	34.24	31.69	29.69
Others *	33.78	37.38	24.19	38.44	37.51	35.81
Total	203.48	220.08	205.06	234.58	227.59	223.91

Source: Directorate of Economics and Statistics, MoA, GoI

*Others include moth, lathers, kulthi

As can be seen from table 1.5, that area under pulses which was 203.48 lakh ha. during 2000-01 had increased to 223.91 lakh ha. during 2005-06 (10 per cent).

Fig.7 : Area under major pulses production (lakh Ha.)



Production of Major Varieties of Pulses in India

The production of major varieties of pulses in India during 2000-01 to 2005-06 is indicated in table 1.6.

Table 1.6 Production of major varieties of pulses in India during 2000-01 to 2005-06

(lakh tons)

Pulse	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06
Tur/Arhar	22.65 (618)	22.6 (679)	21.06 (651)	23.56 (670)	23.47 (667)	27.38 (765)
Chana	38.55 (744)	54.73 (835)	42.37 (717)	57.17 (811)	54.69 (815)	56.00 (808)
Masur	9.15 (619)	9.74 (664)	8.73 (634)	10.38 (743)	9.94 (675)	9.46 (629)
Peas/Beans	5.36 (819)	6.08 (906)	5.92 (891)	7.25 (1022)	7.86 (993)	7.1 (896)
Mung	10.23 ((340)	11.11 (360)	8.67 (288)	17.02 (480)	10.58 (317)	9.46 (304)
Urad	12.96 (431)	14.99 (454)	14.73 (415)	14.71 (430)	13.27 (419)	12.45 (419)
Others *	12.03	14.44	9.77	18.95	11.49	11.99
Total	110.93 (544)	133.69 (607)	111.25 (543)	149.04 (635)	131.00 (577)	133.84 (598)

Figures in the parentheses indicates the productivity of pulses

Source: Directorate of Economics and Statistics, MoA, GoI

*Others includes moth, lathers, kulthi

Among the major varieties of pulses, productivity of peas was highest at 896kg/ ha. in 2005-06, while it was lowest at 304 kg/ha.for Mung. Productivity of Chana was recorded at 808 kg/ha followed by 765 kg/ha. for Tur, 629 kg\ha for Musur and 419 kgs /ha.for Urd. Productivity of all pulses except Mug and Urad increased during 2000-01 to 2005-06.

State wise Scenario

Area, production and yield of major varieties of pulse growing States in 1995-96 & 2006-07 is indicated in table 1.7

Table 1.7 Area, production and yield of pulses in major States in India in 1995-96 and 2006-07

	1995 -1996			2006—2007		
State	Area (Million Ha)	Production (Million Tons)	Yield (Kg/ha)	Area (Million Ha)	Production (Million Tons)	Yield (Kg/ha)
Maharashtra	3.3	1.67	503	3.83	2.30	602
Madhya Pradesh	5.1	3.1	604	4.11	3.20	780
Uttar Pradesh	2.9	2.3	770	2.72	1.98	725
Rajashtan	3.6	1.5	409	3.21	1.48	462
Andhra Pradesh	1.5	0.6	416	1.98	1.35	679
Karnataka	1.5	0.7	474	2.37	0.89	377
Gujarat	0.8	0.5	543	1.00	0.59	593
Chhattisgarh				0.91	0.49	543
Bihar	0.9	0.6	620	0.61	0.44	722
Odisha	2.2	1.2	537	0.79	0.35	445
Timal Nadu	0.9	0.4	374	0.54	0.29	541
Jarkhand				0.38	0.26	686
West Bangel	0.2	0.1	641	0.22	0.15	703
Haryana	0.4	0.4	972	0.17	0.14	824
Others	0.4	0.2	-	0.35	0.29	-
All India	23.70	13.27	552	23.19	14.20	612

Source: Directorate of Economics and Statistics, MoA, GoI

It is revealed from the data presented in table 1.7 that there is difference in quantum of pulses produced across the States due to variation in productivity. Yield per ha. is lowest (377 kg per ha) in Karnataka and highest in Haryana (824 kg per ha) in 2006-07.

Country-wise area, production and yield of tur / arhar is indicated in table 1.8.

Global scenario of Tur/Arhar (red gram)

World area, production and yield of Tur/ Arhar across the country in 2005 is depicted in table 1.8:

Table 1.8 Area, production and yield of Tur/ Arhar across the country in world in 2005

Country	Area(in ha)	% share	Production (in tons)	% share	Yield (kg/ha)
India	**3500000**	**76.3**	**2400000**	**73.2**	**685**
Kenya	200000	4.4	105000	3.2	525
Malawi	123000	2.7	79000	2.4	642
Myanmar	540000	11.8	500000	15.3	925
Nepal	29000	0.6	26000	0.8	896
Tanzania	68000	1.5	50000	1.5	735
Uganda	84000	1.8	84000	2.6	1000
Others	43042	0.9	33995	1.0	810
World	**4587042**	**100**	**3277995**	**100**	**714**

Source: FAO Statistics.

It could be seen from table 1.8 that India is the main country producing tur/arhar with more than 76 per cent of world area and more than 73 per cent of world production. However, India's productivity per ha. is 3 rd lowest after Kenya and Malawi. The highest productivity per ha. is Uganda and Myanmar. The average productivity of world is 714 kg/ha. against 685 kg/ha. in India.

Fig.8

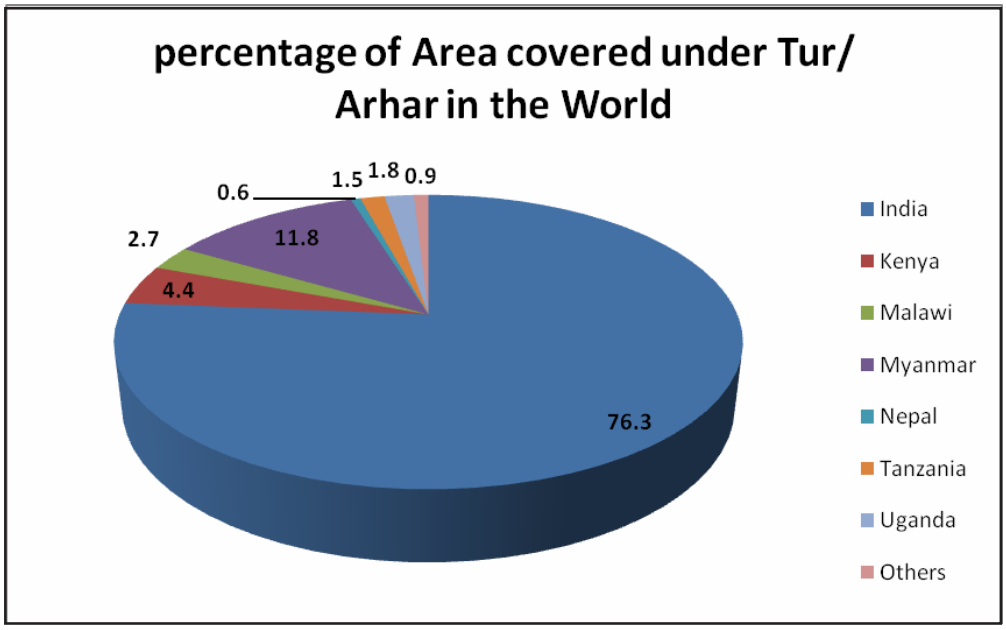
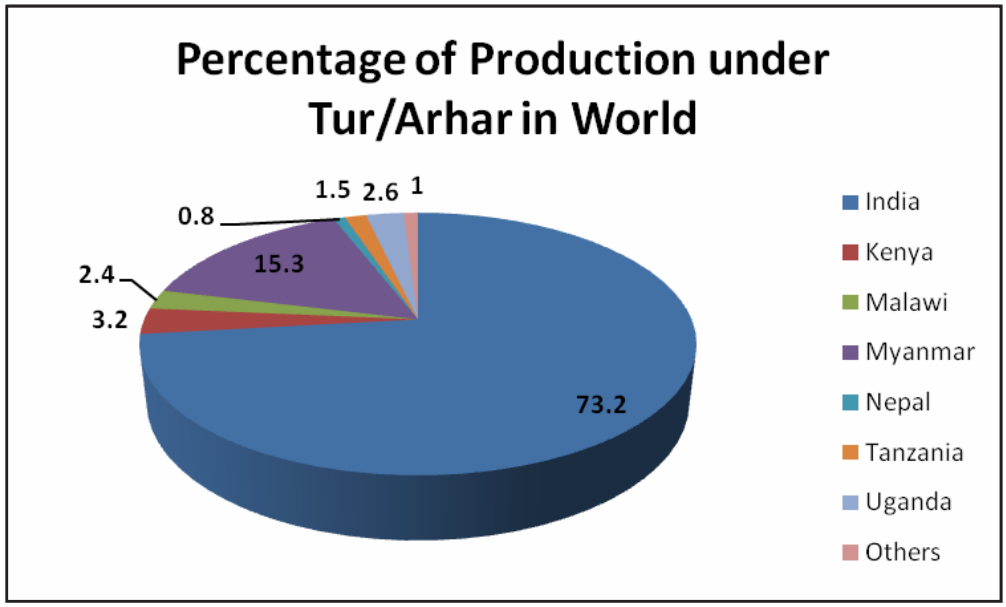

percentage of Area covered under Tur/ Arhar in the World
0.6
1.5
1.8
0.9
2.7
11.8
4.4
76.3
India
Kenya
Malawi
Myanmar
Nepal
Tanzania
Uganda
Others

Fig.9


Percentage of Production under Tur/Arhar in World
1.5
2.6
1
0.8
2.4
15.3
3.2
73.2
India
Kenya
Malawi
Myanmar
Nepal
Tanzania
Uganda
Others

World area, production and yield of Chana/ Gram across the country in 2005 are depicted in table 1.9

Table1.9 Area, Production and Yield of Chana / Gram across the country in world in 2005

Country	Area (in ha)	% share	Production (in tons)	% share	Yield (Kg/ha)
India	**7290000**	**65.3**	**5770000**	**67.2**	**791**
Australia	113000	1.0	114000	1.3	1008
Ethiopia	168089	1.5	135930	1.6	808
Iran	755000	6.8	310000	3.6	410
Mexico	150000	1.3	240000	2.8	1600
Myanmar	208000	1.9	230000	2.7	1105
Pakistan	989000	8.8	548000	6.4	555
Turkey	630000	5.6	650000	7.6	1031
Others	855336	7.7	585209	6.8	684
World	**11155425**	**100**	**8583139**	**100**	**769**

Source: FAO Statistics.

Data presented in table 1.9 states that India produces 67 per cent of chana /gram of the world. However, the productivity is third lowest (791 kg/ha) after Iran (410kg/ ha) and Pakistan (555 kg/ha). The highest productivity per ha is in Mexico (1600 kg/ ha) followed by Myanmar (1105kg/ ha), Turkey (1031 kg/ha) and Australia(1008 kg/ ha) . The average productivity of world is 769 kg/ha. against 791kg/ ha. in India.

Fig.10

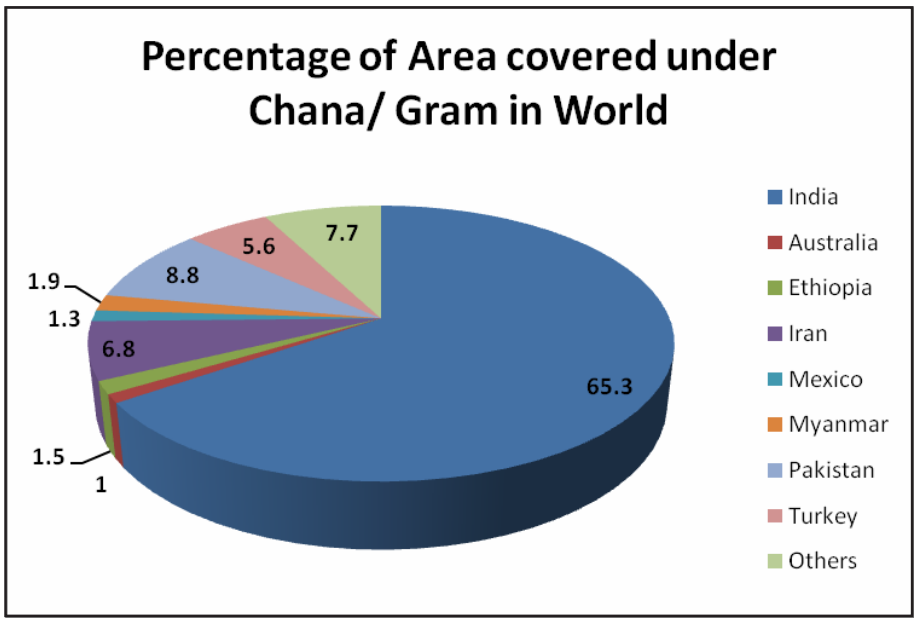
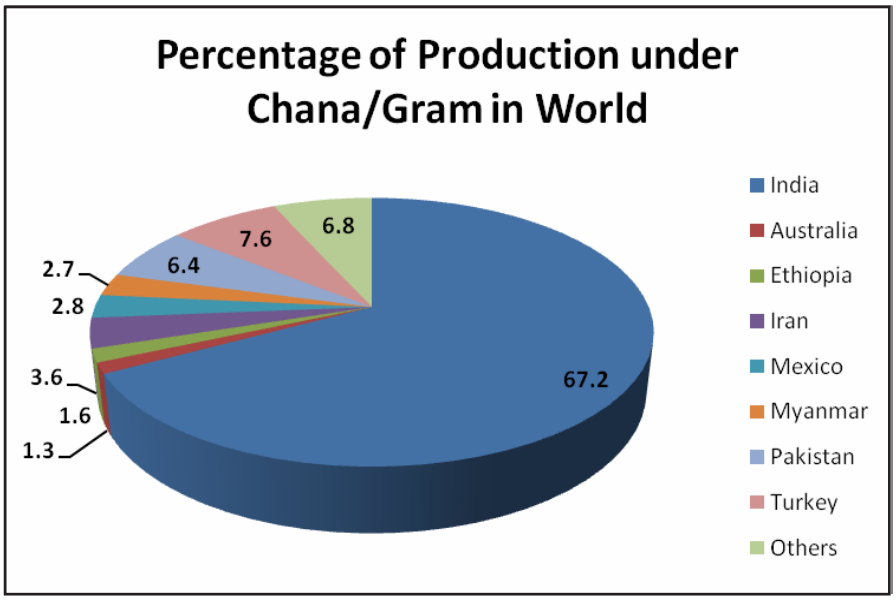


Fig.11

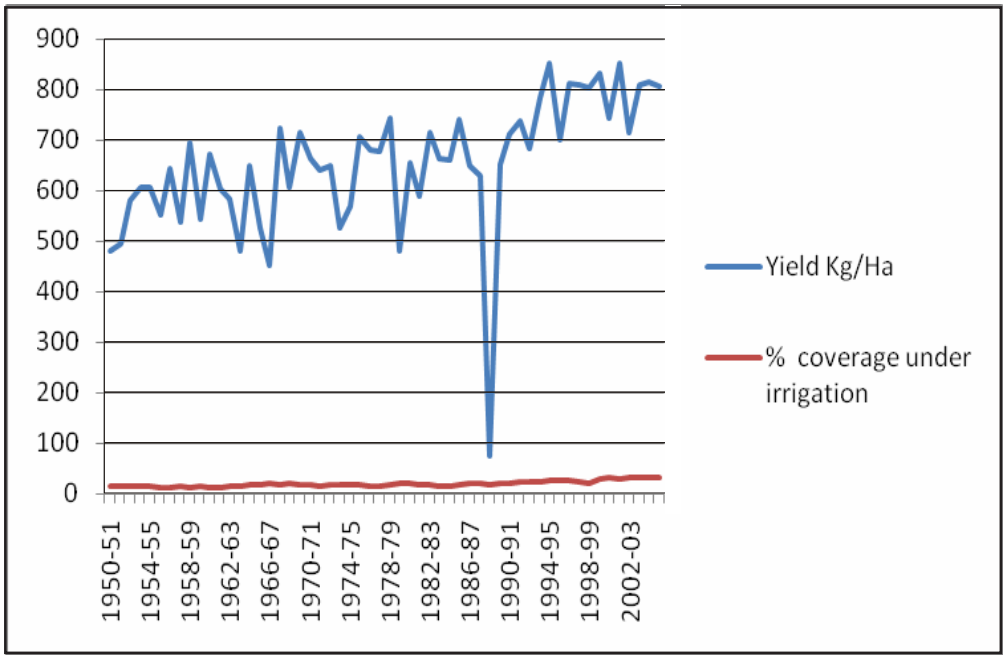


Area, Production and Productivity of Chana in India

India is the largest producer of chana/gram in the world. The data relating to area, production and yield of chana in India during 1950-51 to 2007-08 is given in **Annexure-2.**

It is observed from Annexure-2 that during 1950-51 to 1959-60 area under chana jumped up from 7.57 million hectares to 10.33 million hectares showing an increase of 36.5 per cent. However, the same trend was not observed in subsequent period. Area got reduced to 7.58 million hectares in 2007-08 from 9.28 million hectare in 1960-61. The growth of area was 1.3 per cent during last 57 years. During this period, production has increased from 3.65 million tons (1950-51) to 6.91 million tons (2007-08) witnessing a growth of 89.3 per cent and yield improved from 482 kg/ha in 1950-51 to 780 kg/ha in 2007-08 registering a growth of 61.8 per cent. Growth in production was solely due to productivity gain and not because of area expansion. This productivity gain could be attributed to increased area under irrigation from 12.5 per cent in 1950-51 to 32.1 per cent in 2002-03.

Fig.12 : Yield of Chana and percentage area irrigated to total area during 1950-51 to 2005-06



State Wise Scenario

The major chana growing States are Madhya Pradesh, Maharashtra, Rajasthan, Uttar Pradesh, Andhara Pradesh and Karnataka. Area, production and yield of chana in major States during 2006-07 are indicated in table 1.10.

Table 1.10 Area, production and yield of chana in major States in India during 2006-07

State	Area		Production		Yield
	Million ha	% to all India	Million Tons	% to all India	Kg/ha
Maharashtra	1.31	17.49	0.92	16.20	706
Madhya Pradesh	2.46	32.84	2.41	22.54	980
Rajasthan	1.01	13.48	0.87	13.94	863
Uttar Pradesh	0.68	9.08	0.50	9.51	742
Karnataka	0.65	8.68	0.31	6.27	473
Andhra Pradesh	0.60	8.01	0.65	10.42	1085
Haryana	0.11	1.47	0.09	1.42	843
All India	7.49	100	6.33	100	845

Source: Directorate of Economics and Statistics, Dept. of Agriculture and Cooperation, Ministry of Agriculture, GoI.

It could be seen from table 1.10 that maximum area covered under Chana was to the extent of 32.84 per cent in MP followed by Maharashtra (17.49 per cent). Share in production was 22.54 per cent in Madhya Pradesh followed by Maharashtra (16.20 per cent). Highest yield was registered at 1085 kg/ha in Andhra Pradesh followed by Madhya Pradesh (980 kg/ha.), Rajasthan (863 kg/ha), and Haryana (843kg/ha).

Fig.13 : Area and Production of Chana across the States in India during 2006-07

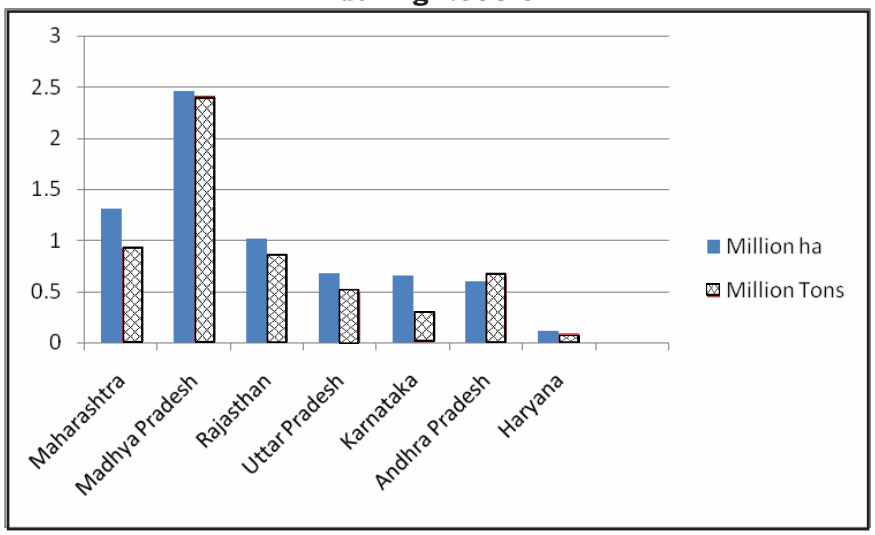
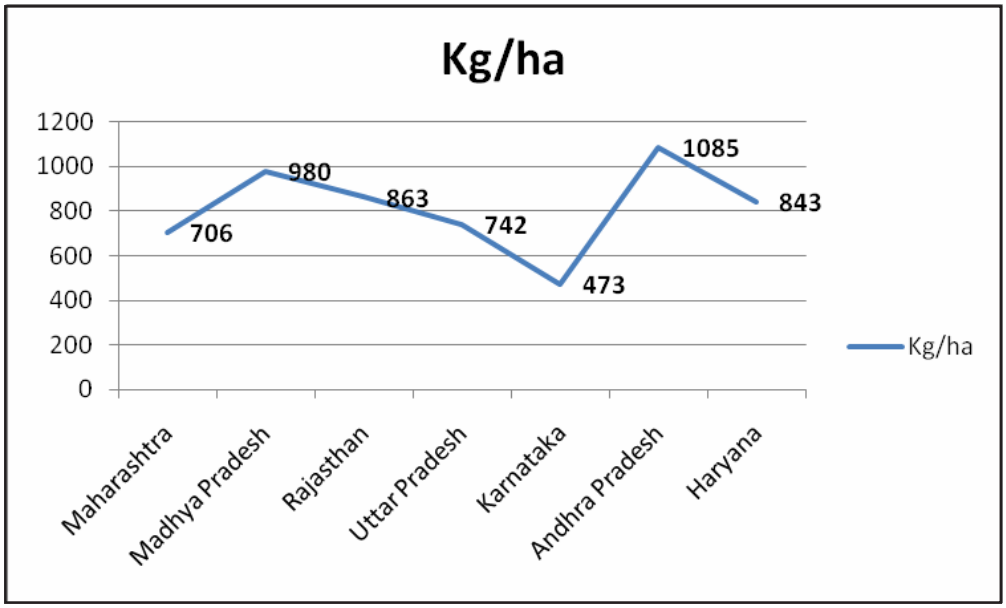


Fig.14 : Yield of Chana across the States in India during 2006-07



Per Capita Net Availability of Pulses

The fluctuation in production has cast an impact on the net availability of pulses in the country as can be seen from table 1.11.

Table 1.11 Per capita net availability of pulses and Cereals in India during 1950-51 to 2005-06

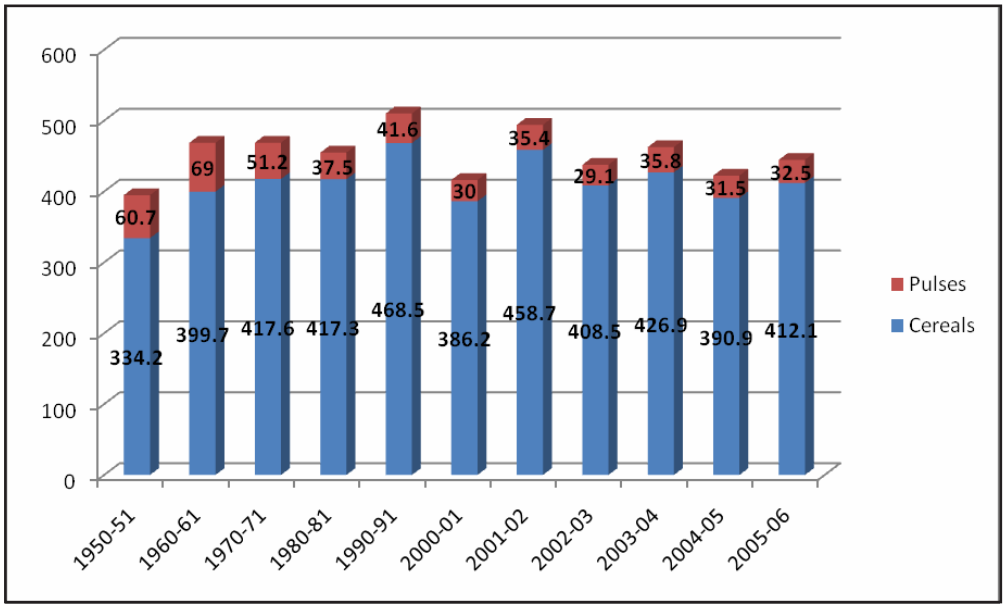
(Grams/day)

Year	Cereals	Pulses	Total food grains
1950-51	334.2	60.7	394.9
1960-61	**399.7**	**69.0**	**468.7**
1970-71	417.6	51.2	468.8
1980-81	417.3	37.5	454.8
1990-91	468.5	41.6	510.1
2000-01	386.2	30.0	416.2
2001-02	458.7	35.4	494.1
2002-03	**408.5**	**29.1**	**437.6**
2003-04	426.9	35.8	462.7
2004-05	390.9	31.5	422.4
2005-06	412.1	32.5	444.5

Source : Directorate of Economics and Statistics, Dept. of Agriculture and Cooperation, Ministry of Agriculture, GoI

Despite the fact that India is the largest producer of pluses in the world with 25 per cent of total production, 30 per cent of total consumption and 33 per cent of global acreage under pluses, the per capita domestic consumption /availability of pluses has declined from 69.0 grams/day in 1960-61 to 32.5 grams/day in 2005-06. Lowest per capita net availability stood at 29.1 grams/day was during 2002-03. Per capita net availability of food grains in India during 1951 to 2007 (rice, wheat, others cereals ,cereals, gram and other pulses) are indicated in **Annexure- 3**

Fig.15 : Per capita availability of cereals and pulses in India during 1950-51 to 2005-06



CHAPTER 2

Objectives and Methodology

This chapter outlines briefly the objectives, sample design and methodology adopted for the study.

The Need of the Study

The New Agricultural Technology (NAT) introduced during the mid-sixties did not make uniform impact on all the crops. Production of rice and wheat increased substantially, while it was almost stagnant in pulses at 14 million tons. Due to stagnation in area (23 million ha) and production of pulses(14 million tons) together with increase in population, the per capita availability of pulses fell drastically. It declined from 69 grams/day in 1960-61 to 32.5 grams/day in 2005-06. The world Health Organisation recommends that for India the consumption of pulses should be at 80 grams/capita /day. India will require 38 MT of pluses by 2017-18. Despite many promotional schemes for increasing pulses production during the various plan periods (**Annexure 4**, the growth in pulses production was slow) . In view of this it becomes necessary to understand the pulses sector in light of the constraints faced in production, processing, marketing, and international trade and suggest remedial measures.

The protein content in pulses is about 18-25 per cent. This makes pulses one of the cheap sources of protein for human consumption. Productivity of pluses in India has been very low at 622 kg/ha, compared to 1908 kg/ha in Canada and USA. Govt of India took series of initiatives to develop the sector, details of which are given in **Annexure 5**.

Objectives

The main objectives of the study are:

- To analyze the trend in pulses
- To find out the factors affecting the growth of pulses area, productivity etc
- To work out the economics of production of major pulse crops and of dal processing units
- To study marketing channels and
- To suggest policies for development of this sector

Methodology

Selection of States

The study was conducted in Uttar Pradesh, Andhra Pradesh, Karnataka, Haryana and Odisha states. State wise samples are indicated in table 2.1.

Table 2.1 Sample size

State	District covered (No)	Farmers (No)	Processing units (No)	Traders/ Commission Agents (No)	Total (No)
Odisha	2	70	6	10	88
Andhra Pradesh	2	60	11	2	75
Karnataka	2	40	10	30	82
Uttar Pradesh	2	52	4	7	65
Haryana	2	63	8	8	81
Total	10	285	39	57	391

Selection of Major varieties of Pulses

Details are sown in table 2.2.

Table 2.2 State wise major pulses grown and selected for study

State	Major pulses grown	Pulses studied
Odisha	Tur Mung Urad Chana	Tur Mung Urad
Andhra Pradesh	Chana Tur Urad Mung	Chana Tur Urad
Karnataka	Chana Tur Mung Urad Musar	Chana Tur Mung Urad
Uttar Pradesh	Chana Masur Tur Urad Mung	Chana Masur Tur
Haryana	Chana Mung Masur	Chana

Data Collection

The study was based on both primary as well as secondary data. The primary data was collected thorough a structured survey schedules, which were used for procuring data on cost of cultivation (input, output) from sample farmers and dal mill processing units, marketing channels and margins etc. The secondary data on area, production, yield, farm gate prices, wholesale prices, minimum support prices, imports and exports were obtained from different sources.*

The cost concepts used by the Commission on Agricultural Costs and Prices (CACP) were used. The input output analysis and growth rates based on the primary and secondary data respectively were carried out.

Cost Concepts

For estimating the cost of cultivation of pulses, the cost concepts used by the Commission on Agricultural Costs and Prices (CACP) were used. The cost concepts used for the analysis are Cost A1, Cost B 1, Cost B2, Cost C1 and Cost C2.

Cost A1= Hired labour, tractor, seeds, Farm Yard Manure (FYM), fertilizers, chemicals and pesticides, irrigation and miscellaneous charges (repairs, depreciation charges on implements and farm buildings, land revenue and taxes).

Cost B1 = cost A1 + interest on investment and interest on working capital

Cost B2 =cost B1 + rental value of owned land

Cost C1 = cost B1+ family labour

Cost C2 = cost C1 = risk premium

Cost C3 = cost C2 = management cost

Cost of hired human labour was charged at the prevailing wage rates for male and female.

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* such as pre conference volume National conference on Impact of WTO negotiations on Indian Agriculture, Industry, Trade and Services held on 11- 13 December 2004 at PG Dept. of Economics, Vivek Vardhini College of Arts, Commerce, Science and PG studies , Jambagh, Hyderabad, Study No 79, Economics of Pulses production and identification of constraints in raising their production (A consolidated report of AERC studies) Agro –Economic Research Center for MP, JNKVV, Jabalpur, various issues of Business Line, Economic Times, Financial Express, Lokmat and Maharashtra Times (Marathi).

Cost of bullock labour was estimated at the prevailing wage rates paid per day for the services of a pair of bullocks.

Cost incurred on hiring tractor services was worked out at the prevailing per hectare rates. Farmers having their own tractor also apply the same rate.

Farm produced seeds were taken at the prevalent village prices. Purchased seeds were taken at the rate paid by the sample farmers.

Farm produced manure was taken at the village prices prevalent at the time of sowing.

FYM purchased was taken at actual rate paid by the sample farmers.

Cost for fertilizers and plant protection chemicals and pesticides were the amounts actually paid by the sample farmers.

The electrical or diesel charges were determined in proportion to the acreage under the crops.

Repairs charges were based on the sample farmers' estimate of normal annual repairs for each item of equipment used. These charges for a particular crop are calculated in proportion to the acreage under the crop. In case of implements/equipments is used only for a particular crop, the entire repair charges were charged to that crop only.

Miscellaneous charges included the expenses incurred by sample farmers on the items other than any specified items. Transportation charges incurred while procuring input materials cost incurred for obtaining credit etc.

Depreciation charges on implements/machineries were calculated by straight line method. The original cost of item was divided by the expected life of the item. Allocation of depreciation charges to individual crop was done in proportion to the acreage under the crops. In case of implements/machineries was used only for a particular crop, the entire amount of depreciation charges was applied to that particular crop.

Land revenue and other taxes were charged at the rates levied by the government. Allocation of the cost was done in proportion to the area under the crop.

Non – paid out Costs:

Interest on crop loan was levied at 7 per cent per annum at the conduct of field visit.

Interest rate on payment to physical capital (implements and machineries) was charged on the purchased value of the implements/ machines @ 12 per cent per annum. The allocation of cost to different crops grown by sample farmers was done in proportion to the acreage under the crop.

Rental value of land was calculated at 25 per cent of the gross income generated from the production of crop.

Services of the family labour were calculated at same rate as it was done for hired labour.

Rate of risk premium was estimated on total insurance amount of a particular crop. Risk premiums levied were 1.5 to 3.5 per cent of the insurance premium amount.

For managerial services of sample farmers, 15 per cent of total cost was taken in to account.

The cost of cultivation and net income was calculated on per acre basis.

Reference Year of the Study

The reference year of the study was 2007-08. The inputs were valued at the prevailing market prices. The output was valued on the basis of farm gate harvest prices. All benefits, costs, / returns were calculated at 2007-08 prices so as to derive desired results.

The Report

The present commodity study on pulses is a consolidation of studies, which were conducted by 5 Regional Offices namely (i) Odisha, (ii) Andhra Pradesh, (iii) Uttar Pradesh, (iv) Haryana, and (v) Karnataka. The reports were drafted by the concerned Regional Offices. DEAR, HO, Mumbai prepared the consolidated report.

CHAPTER 3

Economics of Major Varieties of Pulses Production

This chapter deals with economics of pulses production with reference to four varieties like Tur, Chana, Mung and Urad. For this purpose, data on cost of cultivation, output of pulses and value of output has been gathered from sample farmers. Cost, benefit/ income and net income per acre and per kg of unprocessed pulses has been arrived at. State-wise, Pulse-wise varieties recommended are shown in table 3.1

Table 3.1 State - pulse wise varieties recommended

State	Tur	Urad	Mung	Chana	Masur
Odisha	Mahak, UPAS-120, Jagruti, Laxmi, Maruti	Sarala, TP, LBG-17, PU –30, TU – 94-2, PU 35, WBG – 26, TU – 94.2, Prasad	TARM-1& 2,Pusa 9531,9072 & Bold –1, Sujata, Jagruti, Jyoti, Kedar, Dhauli, PDM-11, Durga, Samart, Pragyan		
Karnataka	DSMR, TTB-7, HYD-3c, BRG-1, ICPL- 8863, BRG-2, ICPL-1035	TAU-1, Karagaun-3, T-9, Rashmi (LBG-625)	PS –16, Pusa Baisak, PDM 84-178	A-1, JK –11, KAK – 2, Vishal	
Andhra Pradesh	Palnadu LRG 30, Maruthi ICP 8863, ST 1 or C11, Abhaya ICPL 332, Lakshni ICPL 85063, MRG 66, HY3-C Durga ICPL 84031, PRG 100	LBG 17, LBG 20(Teja), T-9, LBG-623, LBG –402 (Prabhav), Pant U 30		Kranthi ICCC –37, Swetha ICCC-2, Annegiri, Jyothi, ICCV –10 (Bharathi), LBeG 7.	
Uttar Pradesh	UPAS 120,Manak, Pusa 9,84,33,992,Bahar, Narendra1,Amar			Pusa 256, 362,372, 391,DCP 92-3, GNG 663, Alok, GCP105, KWR 108, KPG 59, BG 1003 (kabuli), Vijay, JG 315, Vishal, GCP 101,SAKI 9516	Pusa 4 Vibhav, Pant 406,639, Narendra 1,Malika, L 4076, Noori, Jawahar 3
Haryana				BG 1003 (kabuli)	

Farm Business Income

The sample farmers on an average kept one third of the produce for own consumption and use for seeds. The rest of produce was sold. The gross value of output sold was calculated by multiplying the average farm gate price with the quantity. Net income was arrived at by deducting the various cost, out of the gross value of the output sold. Costs of cultivation and price realization per kg have also been attempted.

Table 3.2 Cost of cultivation of Tur

(Rs /acre)

SN	Particulars	Unit	Phy units	Value (Rs)
	Cost A1			
1	Hired Human labour	Man days	15	675
2	Bullock labour	Pair/days	2	300
3	Tractor	Hours	0.5	90
4	Seeds	Kgs	5	150
5	FYM	Tons	0.25	125
6	Fertilizer	Bags	2	1000
7	Chemicals and pesticides	Spray	2	950
8	Irrigation			0
9	Repairs			75
10	Misc .charges			30
11	Depreciation charges			240
12	Land revenue and taxes			5
13	Total cost A1			3640
	Interest on investment			50
	Interest on working capital			250
	Cost B1 = cost A1 + interest			3940
	Rental value			1000
	Cost B2 = CostA1 + rental value			4940
	Imputed value of family labour	Man days	5	270
	Cost C1= B2 + family labour			5270
	Risk premium			45
	Cost C2 = C1 + Risk premium			5255
	Managerial cost			775
	Cost C3 = C2+ Managerial cost			6030
14	Out put	Qtls	5	12525
15	Total cost (C3)			6030
16	**Net income (14-15)**			**6495**

Source—Field data

Table 3.2 portrayed that fertilizers, chemicals and pesticides together constituted 32.4 per cent followed by hired human labour at 11.2 per cent were the major items among the paid out costs. Rental value and managerial cost formed the major items among the non paid out costs at 16.6 and 12.9 per cent respectively.

Table 3.3 Cost of cultivation of Urad (Rs /acre)

SN	Particulars	Unit	Phy units	Value (Rs)
	Cost A1			
1	Hired Human labour	Man days	20	1,000
2	Bullock labour	Pair/days	2	300
3	Tractor	Hours	2	200
4	Seeds	Kgs	8	400
5	FYM	Tons	0.15	150
6	Fertilizer	Bags	2	1,000
7	Chemicals and pesticides	Spray	1	300
8	Irrigation			0
9	Repairs			50
10	Misc .charges			30
11	Depreciation charges			150
12	Land revenue and taxes			5
13	Total cost A1			3,585
	Interest on investment			50
	Interest on working capital			65
	Cost B1 = cost A1 + interest			3,700
	Rental value			400
	Cost B2 = Cost A1 + rental value			4,100
	Imputed value of family labour	Man days	10	500
	Cost C1= B2 + Family labour			4,600
	Risk premium			37
	Cost C2 = C1 + Risk premium			4,637
	Managerial cost			700
	CostC3 = C2+ Managerial cost			5,337
14	Out put	Qtl	5	13,500
15	Total cost (C3)			5,337
16	**Net income (14-15)**			**8,163**

Source—Field data

Table 3.4 Cost of cultivation of Mung (Rs/acre)

SN	Particulars	Unit	Phy units	Value (Rs)
	Cost A1			
1	Hired Human labour	Man days	20	1,000
2	Bullock labour	Pair/days	2	300
3	Tractor	Hours	2	200
4	Seeds	Kgs	7	225
5	FYM	Tons	0.15	150
6	Fertilizer	Kg	50	485
7	Chemicals and pesticides	Spray	2	600
8	Irrigation			0
9	Repairs			50
10	Misc .charges			30
11	Depreciation charges			150
12	Land revenue and taxes			5
13	Total cost A1			3,195
	Interest on investment			60
	Interest on working capital			180
	Cost B1 = cost A1 + interest			3,435
	Rental value			400
	Cost B2 = Cost A1 + rental value			3,835
	Imputed value of family labour	Man days	10	500
	Cost C1= B2 + Family labour			4,335
	Risk premium			40
	Cost C2 = C1 + Risk premium			4,375
	Managerial cost			656
	CostC3 = C2+ Managerial cost			5,031
14	Out put	Qtl	4	9,200
15	Total cost (C3)			5,031
16	**Net income (14-15)**			**4,169**

Source—Field data

Table 3.5 Cost of cultivation of Chana

(Rs/acre)

SN	Particulars	Unit	Phy units	Value (Rs)
	Cost A1			
1	Hired Human labour	Man days	6	300
2	Bullock labour	Pair/days	2	300
3	Tractor	Hours	075	150
4	Seeds	Kgs	20	400
5	FYM	Tons	0.15	150
6	Fertilizer	Kg	25	300
7	Chemicals and pesticides	Spray	1	100
8	Irrigation			0
9	Repairs			25
10	Misc .charges			40
11	Depreciation charges			35
12	Land revenue and taxes			5
13	Total cost A1			1,805
	Interest on investment			20
	Interest on working capital			63
	Cost B1 = Cost A1 + interest			1,888
	Rental value			1,200
	Cost B2= Cost A1 + rental value			3,088
	Imputed value of family labour	Man days	6	300
	Cost C1=Cost B2 + Family labour			3,388
	Risk premium			45
	Cost C2 = C1 + Risk premium			3,433
	Managerial cost			515
	CostC3 = CostC2+ Managerial cost			3,948
14	Out put	Qtl	3.6	6,084
15	Total cost (C3)			3,948
16	**Net income (14-15)**			**2,136**

Source—Field data

Table 3.6 Pulse-wise cost of cultivation and net income
(Rs/acre)

Pulse	Gross income	Cost of cultivation	Net income
Tur	10827	4760	6067
Chana	11624	6482	5142
Urad	8806	3208	5598
Mung	5620	3094	2526

Source—Field data

Data exhibited that sample farmer's earned highest net income at Rs. 6067 per acre in Tur, while the net income accrued from Mung was lowest at Rs 2526. This inferred that **farmers prefer to go for Tur cultivation.** State-wise economics of major Pulses are shown in table 3.7

Table 3.7 State wise economics of major Pulses (Rs /acre)

State	Parameter	Tur	Chana	Urad	Mung	Masur
Andhra Pradesh	Gross income	15,400	24,200	10,800		
	Cost of cultivation	4,487	8,125	2,976		
	Net income	**10,913**	**16,075**	**7,824**		
Uttar Pradesh	Gross income	12,836	7,715			8,683
	Cost of cultivation	7,130	6,641			6,151
	Net income	**5,706**	**1,074**			**2,532**
Haryana	Gross income		8,495			
	Cost of cultivation		7,213			
	Net income		**1,282**			
Odisha	Gross income	2,545		2,118	2,040	
	Cost of cultivation	1,391		1,312	1,158	
	Net income	**1,154**		**806**	**882**	
Karnataka	Gross income	12,525	6084	13,500	9,200	
	Cost of cultivation	6,030	3,948	5,337	5,031	
	Net income	**6,495**	**2,136**	**8,163**	**4,169**	

Source—Field data

The data revealed that sample farmers cultivating Tur in Andhra Pradesh accrued highest net income of Rs 10,913 per acre followed by Karnataka (Rs 6,495) and Uttar Pradesh (Rs 5,706). In respect of chana , Andhra Pradesh earned net income of Rs 16,075 , while it was Rs 2,136 in Karnataka and Rs 1,282 in Haryana. Net income per acre for Urad in Karnataka was Rs 8,163 followed by Andhra Pradesh (Rs 7,824) . Mung in Karnataka received Rs 4,169 per acre followed by Odisha (Rs 882)

The cost of cultivation and prices vary significantly across States because these inequalities mean that farmers in some States are handicapped with low productivity, higher cost of production and lower prices. The table 3.8 provides a view of the net income to be received on one hectare by cultivating various crops in different States.

Table 3.8 Net income of various crops across the States during 2008-09 (Rs/ha)

State	Rice*	Wheat	Chana	Tur	Urad	Mung
Andhra Pradesh	30,020	-	6,604	26,630	11,790	6,671
Chhattisgarh	-	1,252	-	-	217	-
Jharkhand	4,155	6,174	-	-	-	-
MadhyaPradesh	-	8,221	3,255	9,334	-	-
Rajasthan	-	19,131	3,586	-	224	201
Uttar Pradesh	13,146	10,496	12,703	20,097	1,779	-
Karnataka	42,148	-	-	10,067	-	4,791
Maharashtra	58,147	-	-	18,342	1,188	16
Gujarat	-	21,576	9,205	-	-	-
Odisha	11,588	-	-	3,257	2,261	5,208

Source : Ministry of Agriculture and Agmarknet/ Economic Times dt 2-2-2010

*Paddy has been converted to rice by a factor of 2/3 as stated by the Ministry

The net income received for cultivating one hectare of Tur stood at Rs 26,630 in Andhra Pradesh followed by Uttar Pradesh(Rs 20,097/ ha.), Maharastra(Rs 18,342/ ha.). Madhya Pradesh and Karnataka earned a net income of Rs 9,334 /ha and Rs 10,067/ ha. respectively. Urad earned a net income of Rs 11,790/ ha., while it was less than Rs 2,500/ha.in case of Odisha, Maharastra and Uttar Pradesh. In case of Mung , net income earned was almost one fourth (Rs 6,671/ ha)in Andhra Pradesh and less than half (Rs 4, 791/ ha) in Karnataka. Thus, farmers prefer to cultivate Tur because of higher net income.

CHAPTER 4

Processing of Pulses

Since pulses are consumed in dehusked and split form, the processing of pulses assumes a lot of importance. The processing units help in transforming the raw grains legumes into edible form. At the dal mills processing of all kinds of pulses was undertaken. This chapter presents the processing aspects of the pulses and it economics. Details of processing technology of pulses are given in **Annexure 6.**

Investment Cost of Dal Mill Unit

The land required for the dal mill depends upon the type of milling operations; wet/dry milling for conditioning the pulses prior to dehusking and splitting operations. Generally, one acre land is required for establishing a dal mill unit with a processing capacity of 580 MT/annum. Additional area is required for sun drying of soaked grain legume. The sample dal mill units incurred a cost of Rs 1.75 lakh, which included Rs 1.00 lakh for land and Rs 0.75 lakh for site development including fencing, internal roads and drainage system.

The components of civil construction included the items like raw material, finished goods, store, processing area, office space, machine spare store, gunny bag storage space, panel board room etc. The total cost of the sample dal processing unit was Rs 12.50 lakh. The cost of investment in the components of civil construction is indicated in table 4.1.

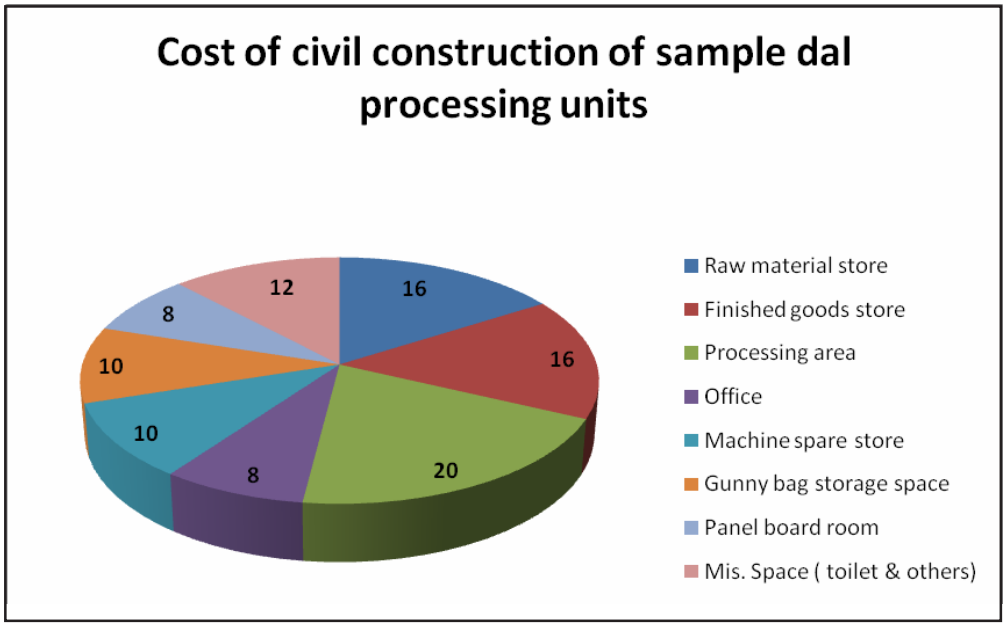
Table 4.1 Cost of sample dal processing unit in civil construction

Item	Size (sq. ft)	*Total cost (Rs Lakh)	% of Cost
Raw material store	800	2.00	16
Finished goods store	800	2.00	16
Processing area	1000	2.50	20
Office	400	1.00	8
Machine spare store	500	1.25	10
Gunny bag storage space	500	1.25	10
Panel board room	400	1.00	8
Mis. Space (toilet and others)	600	1.50	12
Total	5000	12.50	100

Source—Field data

* @ Rs 250/per sq ft.

Fig.16



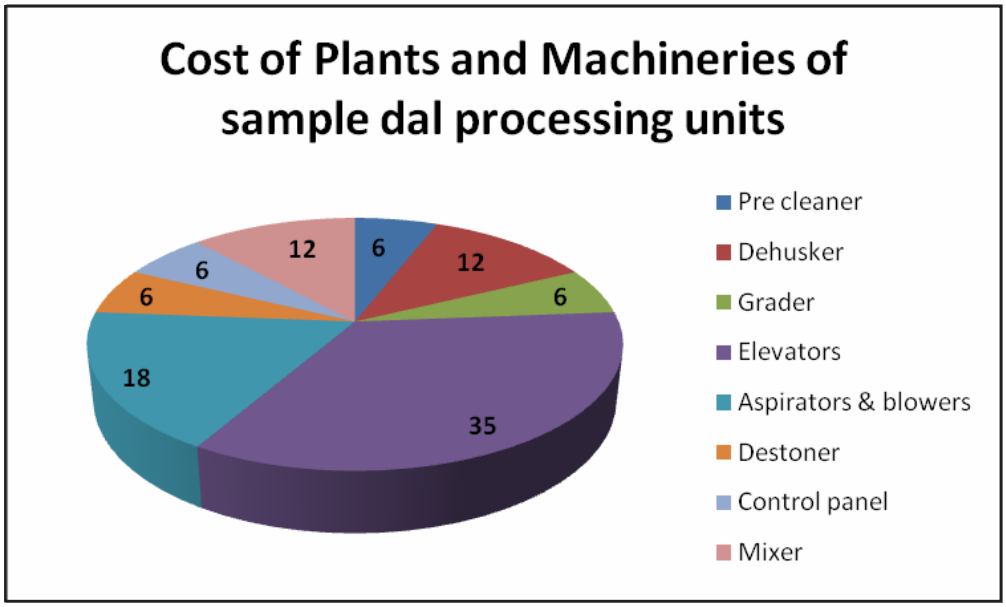
The plants and machinery for the sample processing dal units included pre- cleaner, dehusker, grader, elevators, aspirators and blowers, control panels, destoner, mixer, etc. The total cost of plant and machinery at the reference year is indicated in table 4.2.

Table 4.2 Cost of plant and machinery of the sample dal processing unit

Item	Number	Cost (Rs lakh)	% of Cost
Pre cleaner	1	0.50	6
Dehusker	2	1.00	12
Grader	1	0.50	6
Elevators	4	3.00	35
Aspirators and blowers	3	1.50	18
Destoner	1	0.50	6
Control panel	2	0.50	6
Mixer	2	1.00	12
Total	16	8.50	100

Source—Field data

Fig.17



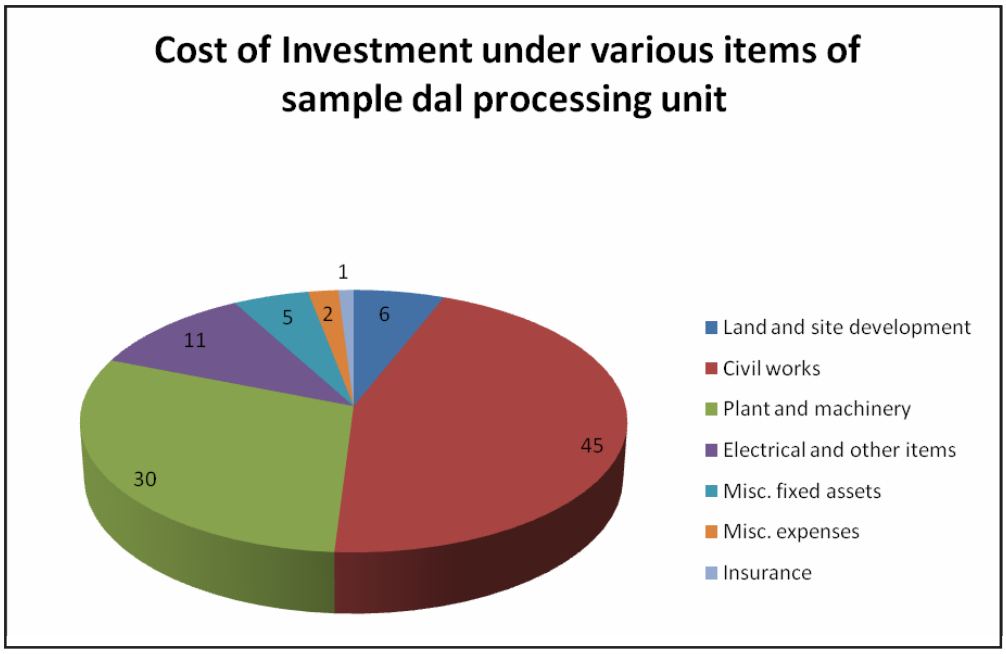
The cost of electrical wiring and other items like generator set, etc. was around Rs. 3.0 lakh. The miscellaneous fixed assets such as pre milling/operating expenses, which are usually unforeseen in nature, are amounted to Rs 0.50 lakh for the sample dal mill unit. Item wise cost of investment of the sample dal mill processing unit is indicated in table 4.3.

Table 4.3 Cost of Investment of the sample dal processing unit
(Rs lakh)

Item of investment	Amount	% to total cost
Land and site development	1.75	6
Civil works	12.50	45
Plant and machinery	8.50	30
Electrical and other items	3.00	11
Misc. fixed assets	1.50	5
Misc. expenses	0.50	2
Insurance	0.30	1
Total	28.05	100

Source—Field data

Fig18



The civil construction accounted for the highest proportion at 45 per cent of overall investment cost followed by plant and machinery (30 per cent), electrical and other items (11 per cent).

The range of main and by products of dal in percentage is shown in table 4.4.

Table 4.4 Main and by products of the sample dal processing unit

Product	**Share in %**
Main	
Dehusked and split pulses	80-82
By products	
Fine dust powder	0.5-1
Brokens	0.5-1
Husk	13-14
Unhusked pulses	1.0
Dehusked whole pulses	1.0
Total	100.00

Source—Field data

The main products of the processed dal consisted of dehusked and split pulses and husk, which constituted around 80-82 and 13-15 per cent respectively. The Mills were selling the main products i.e. dehusked and split pulses and the husk by product. The other by products was taken away by the laborers working in the unit.

The processing capacity of the sample units was 1.60 MT/day. The units were operating for approximately 210 days / 7 months in a year as the processing activity is seasonal in nature. The processing capacity of the unit was estimated at 336 MT/annum. The raw materials are inadequate to run the unit for entire year. The sample dal processing units were having facilities for processing of a variety of pulses like Tur/Arhar, Mung, Urad etc.

Cost of Operation

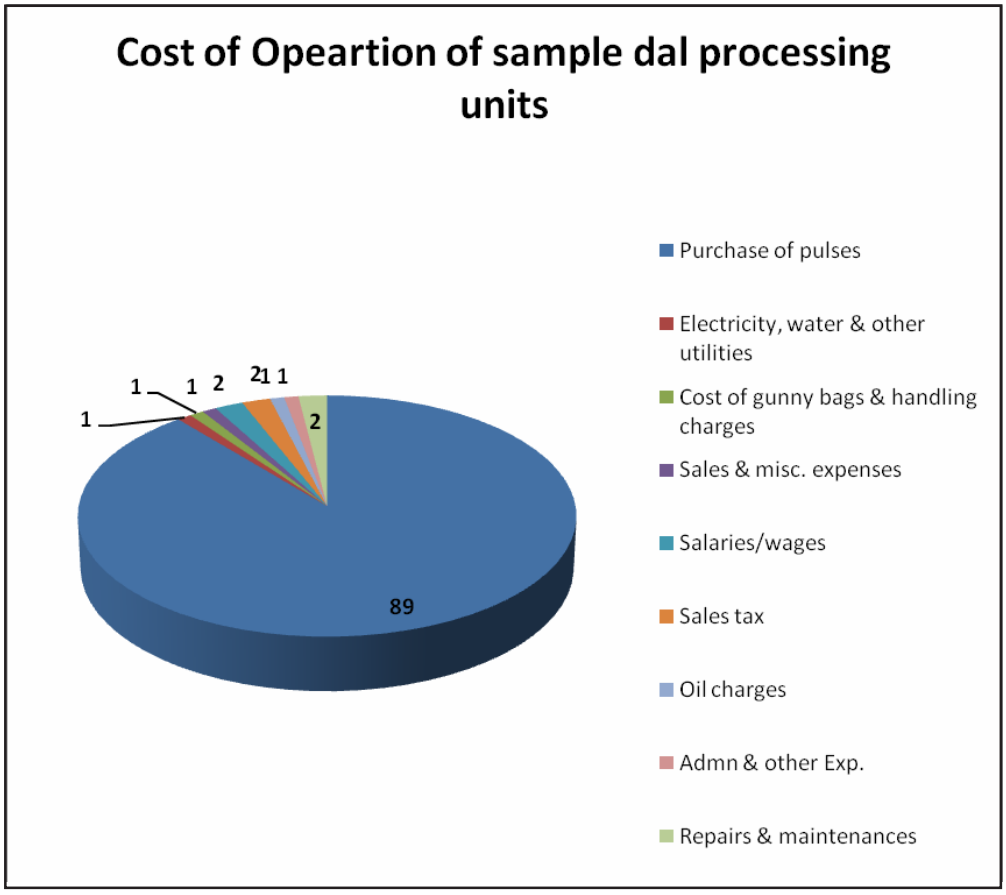
The cost of operations was estimated per MT and the same is indicated in table 4.5.

Table 4.5 Cost of operation of the sample dal processing unit (Rs/MT)

Particulars	Amount	% of Cost
Purchase of pulses	21000	89
Electricity, water and other utilities	225	1
Cost of gunny bags and handling charges	250	1
Sales and misc. expenses	200	1
Salaries/wages	500	2
Sales tax	580	2
Oil charges	250	1
Admen and other Exp.	200	1
Repairs and maintenances	381	2
Total	23586	100

Source—Field data

Fig.19



Purchase Price of Pulses

Field inquiry revealed that majority of owners/ representatives of processing units selected (80 per cent) opined that purchase of raw materials constituted 89 per cent of total cost of operation of the dal unit. They also informed that units were processing different types of pulses, the cost/purchase price of those were different. The price differed from time to time, depending upon the availability. The price immediately after the harvesting was lower in comparison to price after a considerable time gap. Further, the stock of local pulses was sufficient for around five months of processing activity, after which the units had to depend on the pulses from outside the district or the state. The average purchase price of the pulses was estimated at Rs 21,000/MT.

Electricity, Water and Other utilities

Based on field perception the cost of electricity and the utilities like water used in the processing activity was estimated at Rs 225/MT.

Cost of Gunny Bags and Handling Charges

The price of gunny bags of 50 kg was reported to be Rs 10 per piece. The handling charges included all the expenses incurred by the dal mill units from time to time of purchase of the raw materials till the actual processing. The major component of the same was the cost of transportation. The overall cost for the gunny bags and handling charges taken together was estimated at Rs 250/MT.

Sales and Misc. Expenses

Major portion of expenses on sales and other miscellaneous items is included in packing. The average cost for such expenses was estimated at Rs 200/MT.

Salaries /Wages

Field survey observed that the sample dal processing unit, on an average, was employing 5 permanent employees (2 operators, 1 each of accountant, storekeeper and watchman). The salary of the operator/ accountant/ store keeper varied from Rs 2,000 to Rs 3,000 per month, where as that of watchman ranged from Rs 1,500-2,000 per month. Besides this, on all working days 2 skilled and 10-12 unskilled labors were working in the unit. The skilled ones were getting wage of Rs 125/day. For unskilled labour, Male gets Rs 100/ day and female Rs 60/day. The cost of salaries and wages taken together was estimated at Rs 500/MT.

Sales Tax

The sales tax was calculated @ 2.8 per cent of the cost of raw materials. Out of which outside materials cost constituted @ 2 per cent and inside material @ 4 per cent. Thus, sale tax was at estimated at Rs 580/MT.

Oil charges

The oil charges included the expenses incurred for the running of motors and diesel engines for various activities. The charges for the same was estimated to Rs 250/MT.

Administrative and Other Expenses

The administrative expenses included the miscellaneous expenditure on liaison, telephone, advertisement etc, . These were estimated at Rs 200/MT.

Repairs and Maintenance

The repair and maintenance of civil structure, plant and machinery and other miscellaneous fixed assets was taken at 5 per cent of their cost. The amount per MT was estimated at Rs 381.

Total Expenses

The total expenses for processing per MT of pulses thus amounted to Rs 23,586.

Sales Proceeds

The dal processing unit was generating proceeds out of the sale of dehusked pulses and also from the husk. The sales proceeds from 1 MT of raw pulses are calculated in the table 4.6.

Table 4.6 Sales proceeds of sample dal processing unit (Rs/MT)

Item	Out turn %	Rate	Value	% to total
Dehusked pulses	82	30,000	24,600	93
Husk	15	12,000	1,800	7
Total	100*		26,400	100

Source—Field data,* total includes 1 per cent each of brokens, unhusked pulses and dehusked whole- pulses.

The total sales proceeds from 1 MT of raw pulses was calculated to be Rs 26,400 of which Rs 24,600 (93 per cent) was sales proceeds out of dehusked pulses and Rs 1,800 (7 per cent) was the sale of husk.

Net Return/Proceeds

The net returns/proceeds per MT of the sample dal processing unit are presented in table 4.7.

Table 4.7 Net Proceeds of the Sample Dal Processing Unit (Rs/MT)

Particulars	Value
Cost of operations	23,586
Gross sales proceeds	26,400
Net proceeds	2,814

Source : Field data

Taking in to account the cost of operations and the gross sales proceeds at Rs 23,586/MT and Rs 26400/MT respectively, the net sales proceeds of the sample dal processing unit was estimated at Rs 2,814 per MT.

Rate of Return of Sample Dal Processing Units by Capacity Utilization

The sample dal processing units were utilizing 60-65 per cent of their installed capacity during the first and second years and 70 per cent from third year on words. The average investment cost of the sample dal processing unit at Rs 28.05 lakh was taken as the capital cost. The per annum costs/expenses and benefits/income/sales proceeds were calculated on the basis of the costs and benefits per MT. The per annum operation cost of the sample units was considered as the recurring cost. The economics of the unit were worked out keeping the working life of the dal processing unit at 10 years. The economics of the sample dal processing unit is indicated in table 4.8.

Table 4.8 Rate of return of sample dal processing unit (Rs in lakh)

Particulars	First year (60%)	Second year (65%)	Third year on words (70%)
Capital cost	28.05	0	0
Recurring cost	47.83	51.71	55.59
Total cost	75.88	51.71	55.59
Total benefits	53.22	57.66	62.09
Net Benefit	-22.66	5.95	6.50
Benefit Cost Ratio >1			
IRR (%) 24.14			

Source—Field data

The sample dal processing units were found to be viable with BCR being grater than 1 and IRR being 24 per cent.

Break Even Analysis

An attempt has been made to arrive at the breakeven point of operation of the sample dal processing unit. The total cost of processing was considered for this purpose. The total cost of processing included the interest on working capital, fixed capital, depreciation of plants and buildings and the cost of operation of the unit. Details are given in table 4.9.

Table 4.9 Processing Cost for one MT of Pulses

S N	Cost components	Amount (Rs)
1	Total operating cost	23,586
2	Interest on working capital @12 per cent	536
3	Interest on term loan @ 12.5 per cent	263
4	Deprecation of plant and machinery @5 per cent	313
5	**Total processing cost (1 to 4)**	**24,698**
6	Sales proceeds from dehusked pulses	24,600
7	Sales proceeds from husk	1,800
8	**Total sales proceeds (6+7)**	**26,400**
9	Net value addition (6-5)	1,702

Source—Field data

The total processing cost and sales proceeds for milling one MT of pulses has been arrived at Rs 24,698 and Rs 26,400 respectively. The net value addition per one MT of raw pulses has been worked at Rs 1,702, which was around 7 per cent of the operating cost. The input output ratio has been calculated at 1:1.06.

When Break Even Analysis

On the basis of the estimated net profit from processing dal unit at Rs 1702/MT, the Break Even volume for the sample dal processing unit was calculated by using the following formula:

Break Even Volume = Total Fixed Cost/Net profit per MT

=2805000/1702=1648 MT

No. of working days required to achieve the Break Even Volume of output=

Break Even Volume/No. of MT processed /day

=1648/1.6=1030 days

Thus, the sample dal processing units could break even by processing on an average 1648 MT of raw pulses in 1030 days. Since the unit operates on an average for 210 days in a year, the unit can break only in the Fourth Year.

CHAPTER 5

Marketing

The selected farmers reported that their produce was sold in mandis, to agents of dal mills and traders. The farmers marketed pulses as grains. The ultimate product sold is dal. Pulses are also marketed as a raw whole as well as dehusked split. Cleaned and well graded whole grains fetch higher price. For dehusked splits, better packaging is required to reduce post milling losses and to increase acceptability. The marketing of pulses encompasses the wholesale and retail markets. Numerous layers exist in the marketing chain between farmers and consumers. Present chapter analyses the marketing dynamics of the pulses.

Marketing Channels

A characteristic feature of the marketing channel is the large number of intermediaries between the producers and the consumers. The different intermediaries involved in the domestic market are the commission agents, the wholesalers and the retailers. The difference, i.e. the price spread is shared by a large number of intermediaries. The important channels existing in the marketing of pulses are both private and institution.

Private Marketing Channel is a traditional channel and the most common marketing channel operating throughout the country. Most consumers purchase pulses from small, retail establishments where they are sold loose directly from gunny sacks supplied by wholesalers. Pulses are stored and cleaned by the retailers, thus commanding a premium. Packaged pulses in bags of 0.50-5 kilograms (Kg) are available in urban areas. However, packaged pulses are only about 20-30 per cent of total consumption. The study outlined that the main marketing channels for the pulses are, Channel 1 and channel 4.

Channel 1: Farmer/Producer> village trader> dal miller > wholesaler>retailer>consumer

Channel 2**:** Producer>dal miller>retailer> consumer

Channel 3: Producer>wholesaler>dal miller>retailer> consumer and

Channel 4**:** Farmer/Producer> village trader> commission agent> dal miller> wholesaler> retailer>consumer

Institutional Marketing Channel

The institutional arrangement for marketing activities include provision for procuring the pulses by providing minimum support prices to the farmers through agencies like National Agricultural Cooperative Marketing Federation (NAFED). The main institutional marketing channels for the pulses as prevailing in most parts of the country include the following:

Farmer/Producer > procuring agency> dal miller> consumer

Producer> procuring agency > dal miller > wholesaler> retailer> consumer

Producer> procuring agency> dal miller > retailer > consumer

About 95 per cent of selected pulse growers preferred to sell the produce after the harvest. The village traders are the initial link in the whole marketing chain for pulses. Farmers generally sell their pulses in the village itself, in the weekly hats/bazar or in mandis. About 75 per cent of the produce is marketed and the rest is retained by the producers for their own consumption, seeds for next year, etc.

Volume and Value of Trading in Major Pulses in India

Volume and value of trading in major pulses in India during 2004-05 to 2007-08 is indicated in table 5.1.

Table 5.1 Volume and Value of Trading in Major Pulses in India during 2004-05 to 2007-08

(Volume lakh tons and value Rs. Crore)

Pulses	2004-05		2005-06		2006-07		2007-08	
	Volume	Value	Volume	Value	Volume	Value	Volume	Value
Chana	107.42	16755	1240.27	234774	1191.99	306794	381.48	93517
Tur	0.7	60	231.19	41548	53.91	10697	-	-
Urad	65.23	10277	769.81	196904	164.65	53546	-	-

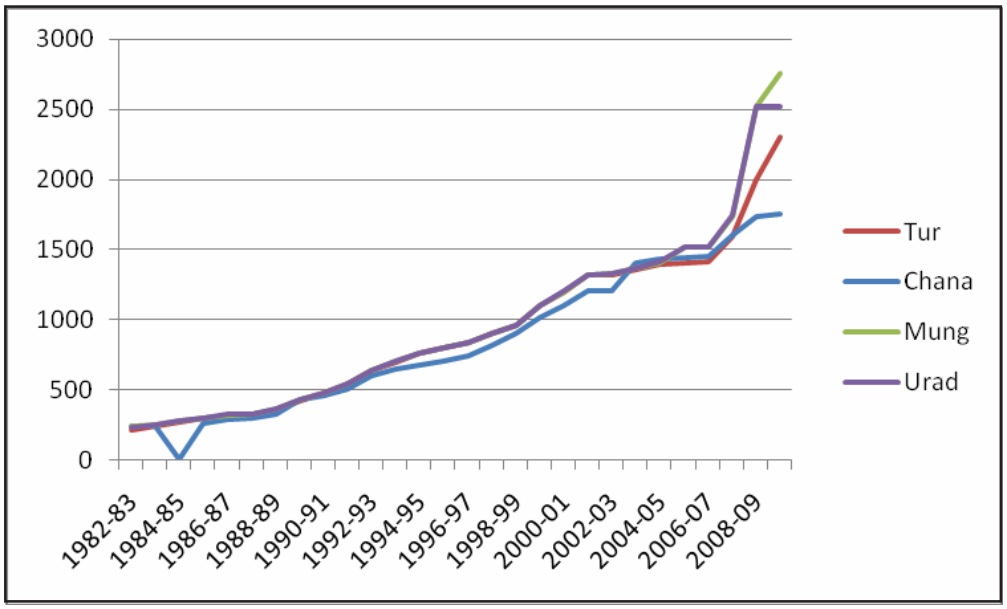
Source: FMC website

— refers not available,

Minimum Support Price (MSP) of Pulses

Due to stagnant domestic production of pulses, GoI has been pursuing of dual programs. These include promotion of domestic production by way of assured minimum support price (MSP) and coverage of pulses under Essential Commodities Act, 1955. MSP for pulses started in 1975-76 with announcement of MSP for gram. From 1978-79 onwards 2 more pulses tur and mung were added. MSP has been announced for all the four major pulses regularly every year from 1979-80 onwards except for gram in 1984-85.The prices suggested for major pulses by the Commission for Agricultural Costs and Prices (CACP) over the years are given in **Annexure-7**.

Fig. 20 : Minimum support prices (MSP) of major varieties of pulses i.e. tur, chana, mung, and urad during 1982-83 to 2008-09



The MSP has registered a CAGR of about 8.6 to 8.8 per cent for different pulses from 1983-84 to 2008-09.

Tur , mung and urad are kharif crops that compete with rice during the season. Chana competes with wheat in the rabi season. Prices of major dal during 2005-2009 is indicated in table 5.2.

Table 5.2 Prices of major dal during 2005 –2009 (Rs/kg)

Dal/year	2005	2006	2007	2008	2009
Tur	24-32	29-35	39-45	45-53	92-100
Mung	29-37	33-52	34-38	36-50	60-85
Masur	22-26	23-25	32-35	50-52	53-57
Makti	19-25	30-42	20-32	22-43	51-75

Prices of pulses continued to remain in the red zone. Prices of Arhar/ Tur dal had increased nearly 4 fold during last five years (2005-2009). Due to this, sale of pulses has been sluggish in terms of volume. There was 70 per cent drop in pulses demand. Price of tur dal, which was Rs 24-32/kg during 2005, had increased to Rs 100/kg in December 2009. Due to sharp rise in tur dal price, consumers are moving to a lower grade of tur dal and are also switching to cheaper pulses like matar/vatana or chana.

Distribution

The portrayed that between the producer and the consumer, a number of functionaries are involved in the distribution of pulse, in its various forms. The following agencies are engaged in the distribution of pulses at various stages of marketing.

Producer>village traders > retailers> wholesalers> commission agents> dal millers/processers >consumers.

Marketing Costs and Margins

It is observed from the study that marketing costs are the actual expenses incurred in flow of goods and services from producer to consumer. The marketing costs normally include (i) handling charges at local points, (ii) assembling charges, (iii) transport and storage costs, (iv) handling charges by wholesaler and retailers. Market fee is charged either on the basis of weight or on the basis of the value of the produce. It is usually collected from the buyers. The market fee differs from market to market and State to State.

The selected processing reported that commissions are usually made in cash and vary from market to market. The seller or the buyer or some times both pay this commission to the commission agents. Besides there are different taxes such as toll tax, terminal tax, sales tax, octorai etc. These vary across the markets and the States.

Accordingly, the rates are also different. These taxes are usually payable by the seller.

Miscellaneous charges cover handling, weighing, loading, unloading, cleaning, charity contribution in cash and kind etc. These charges may be payable either by the seller or by the buyer.

Margins refer to the difference between the price paid and received by a specific marketing agency or by a combination of marketing agencies in the marketing system as a whole. Total marketing margin includes cost involved in moving the produce from producer to consumer and profits of various market functionaries.

Cost involved in moving of pulses from producer to consumer+ profits of various market intermediaries = Total marketing margin.

Due to levy of market fee, commission, taxes levied and other miscellaneous charges, the absolute value of the total **marketing margin varies from market to market, channel to channel and from time to time.**

For example in the Azadpur mandi in Delhi officially the commission is 6 per cent while in practice it goes up to 10 per cent. In Vashi market in Navi Mumbai where the commission goes up to 15 per cent while the official notified rate is 8 per cent.

Marketing Costs and Margins for Two Important Channels

Marketing cost and margins for 2 most important channels, 1 and 4 were computed and are presented in tables 5.3 and 5.4.

It can be seen from table 5.3 that the margins of village trader and processor were Rs 125 per quintal, Rs 511.45 per quintal respectively, it was, Rs 70 per quintal each for wholesaler and retailer.

Table 5.3 Marketing cost and margins of Arhar in Channel 1

SN	Particulars	Rs/Qtl	% to the next links purchase price
1	Producers sale price/village traders purchase price	2,000	
2	Cost incurred by producer/farmer		
A	Cost of gunny bags	25	1.14
B	Loading	3	0.14
C	Unloading, weighing and cleaning	8	0.36
D	Transportation	39	1.77
	Total cost(A+B+C+D)	75	3.41
3	Village traders margin	125	5.68
4	Village traders selling price	**2,200**	**100.00**
5	Processors purchase price	2,200	63.77
6	Fixed operational cost of dal mill	738.55	21.41
7	Processors margin	511.45	14.82
8	Processors selling price	**3,450**	**100.00**
9	Wholesalers purchase price	3,450	95.51
10	Cost incurred by wholesaler		
A	Labour charges	10	0.28
B	Weighing	2	0.06
C	Cleaning and packing	10	0.28
D	Transportation	70	1.94
	Total Cost (A+B+C+D)	92	2.55
11	Wholesalers net margin	70	1.94
12	Wholesalers selling price	**3,612**	**100.00**
13	Retailers purchase price	3,612	96.14
14	Cost incurred by retailer		
A	Labour charges	25	0.67
B	Cleaning and packing	10	0.27
C	Transportation	40	1.06
	Total cost (A+B+C)	75	2.00
15	Retailers net margin	70	1.86
16	Retailers selling /consumers purchase price	**3,757**	**100.00**
17	Producers share in consumer price		**53.23**

Source—Field data

Channel 4 In this channel processors were procuring the raw material from mandi through commission agents. The details of marketing cost and margins of various intermediaries are given in table 5.4.

Table 5.4 Marketing cost and margins of Arhar in channel 4

SN	Particulars	Rs/Qtl	% to the next links purchase price
1	Producers sale price/village traders purchase price	2,000	
2	Cost incurred by producer/farmer		
A	Cost of gunny bags	25	1.14
B	Loading	3	0.14
C	Unloading, weighing and cleaning	8	0.36
D	Transportation	39	1.77
	Total cost(A+B+C+D)	75	3.41
3	Village traders margin	125	5.68
4	Village traders selling price	**2,200**	**100.00**
5	Processors purchase price	2,200	61.99
6	Cost incurred by processor		
A	APMC tax and cess	55	1.55
B	Agents commission	44	1.24
C	Fixed operational cost of dal mill	738.55	20.81
	Total cost (A+B+C)	837.55	23.60
7	Processors margin	511.45	14.41
8	Processors selling price	**3,549**	**100.00**
9	Wholesalers purchase price	3,549	92.06
10	Cost incurred by wholesaler		
A	Labour charges	10	0.26
B	VAT	142	3.68
C	Weighing	2	0.05
D	Cleaning and packing	10	0.26
E	Transportation	70	1.82
	Total Cost (A+B+C+D+E)	234	6.07
11	Wholesalers net margin	72	1.87
12	Wholesalers selling price	**3,855**	**100.00**
13	Retailers purchase price	3855	96.38
14	Cost incurred by retailer		
A	Labour charges	25	00.63
B	Cleaning and packing	10	0.25
C	Transportation	40	1.00
	Total cost (A+B+C)	75	1.88
15	Retailers net margin	70	1.75
16	Retailers selling /consumers purchase price	**4,000**	**100.00**
17	Producers share in consumer price		**50.00**

Source—Field data

In channel-1 the producer sold one quintal of produce at Rs 2000 to village traders who purchased and sold the quantum of produce at Rs 2200 including cost incurred for purchase of gunny bag, loading, unloading and transportation (Rs75) and trader's margin of Rs 125. The village trader sold the produce to processor at Rs 3450, which takes into account fixed cost of dal mill at Rs 739 and processor's margin of Rs 511. The processor sold the produce to whole sellers at Rs 3,612 which is inclusive of marketing cost i.e. cost of labour, weighing, cleaning, packaging and transportation Rs 92 and processor's margin of Rs 70. The processor in due course sold to retailer at Rs 3,757 of which marketing cost and whole seller's margin are Rs 75 and Rs 70 respectively. Thus, consumer purchases the produce at Rs 3,757. Details of break- up of the consumer price showing Producer's share, margins and costs incurred by different entities are indicated in table 5.5.

Table 5.5 Producer's share in Consumer Price of Arhar in Channel 1

Sr. No.	Particulars	Selling Price	Cost incurred for sell i.e. marketing cost	Margin received	Margin as % of sell price
1	**Producer**	2000			
2	**Village Trader**	2200	75	125	5.68
3	**Processor**	3450	739	511	14.81
4	**Whole Seller**	3612	92	70	1.94
5	**Retailer**	3757	75	70	1.86
	Total		**981**	**776**	

Source : Field data

In channel-4 the farmers / producer sold one quintal of produce at Rs 2000 to village traders who purchased and sold the quantum of produce at Rs 2200 including cost incurred for purchase of gunny bag, loading, unloading and transportation (Rs75) and trader's margin of Rs 125. The village trader sold the produce to processor at Rs 3549, which takes into account, APMC tax and cess, agent's commission and fixed cost of dal mill (Rs 838) and processor's margin of Rs 511. The processor sold the produce to whole sellers at Rs 3,855 which is inclusive of marketing cost i.e. cost of labour, weighing, cleaning, packaging and transportation (Rs 234) and processor's margin of Rs 72. The processor sold the produce to retailer at Rs 4,000 of which marketing cost and whole seller's margin are Rs 75 and Rs 70 respectively. Thus, consumers purchase the produce at Rs 4, 000 per quintal. This is exhibited in table 5.6.

Table 5.6 Producer's Share in Consumer's price of tur per quintal of produce in Channel 4 (Rs)

Sr. No.	Particulars	Selling Price	Cost incurred for sell	Margin received	Margin as % of sell price
1	**Producer**	**2000**			
2	**Village Trader**	2200	75	125	5.68
3	**Processor**	3549	838	511	14.40
4	**Whole Seller**	3855	234	72	1.87
5	**Retailer**	4000	75	70	1.75
	Total		**1222**	**778**	

Source : Field data

Table 5.7 Producer's share in consumer's price Channel 1 and 4

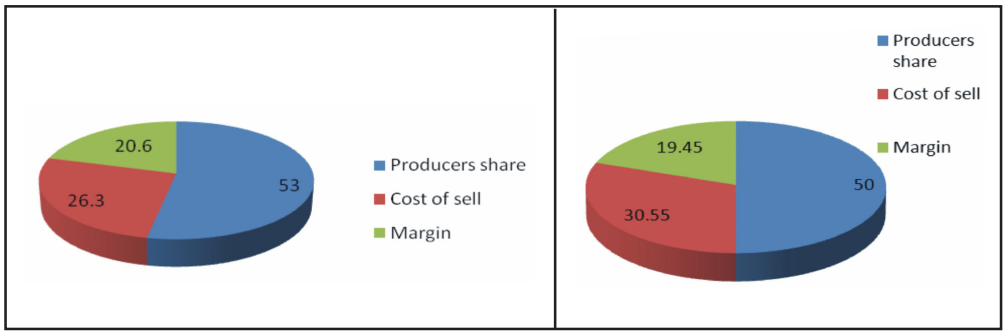
(Rs)

Channel 1				Channel 4		
1	Producers share	**2000**	53	Producers share	**2000**	50
2	Cost of sell	991	26.3	Cost of sell	1222	30.55
3	Margin	776	20.6	Margin	778	19.45
	Total	3767	**100**	**Total**	4000	**100**

Source : Field data

Channel-1 **Channel-4**

Fig. 21 **Fig. 22**



The producer's share in consumer price for Channel 1 and 4 was 53 per cent and 50 per cent respectively. It may be concluded on the basis of the above analysis, that the Channel 1 is the efficient because the producer's share was higher in this channel.

CHAPTER 6

International Trade in Pulses

Introduction

The size of pulses trade of the world is 61.34 million tons. As compared to other agricultural products, the international trade of pulses is limited. The availability of pulses in the world market is uncertain. **There is a mismatch between supply and demand in International market.** India is at a unique position of being the largest consumer of pulses because major portion of population is vegetarian. Once upon a time India was a largest producer of pulses. At present she is a regular importer of pulses. The present chapter makes an effort to analyze agricultural exports and import and their share in total exports to assess the trend. This will enable to know the share of pulses in total agricultural imports.

Agricultural Exports and Imports of India

Agricultural exports and imports of India during 1990-91 to 2007-08 are indicated in table 6.1.

Table 6.1 Agricultural Exports and Imports of India during 1990-91 to 2007-08

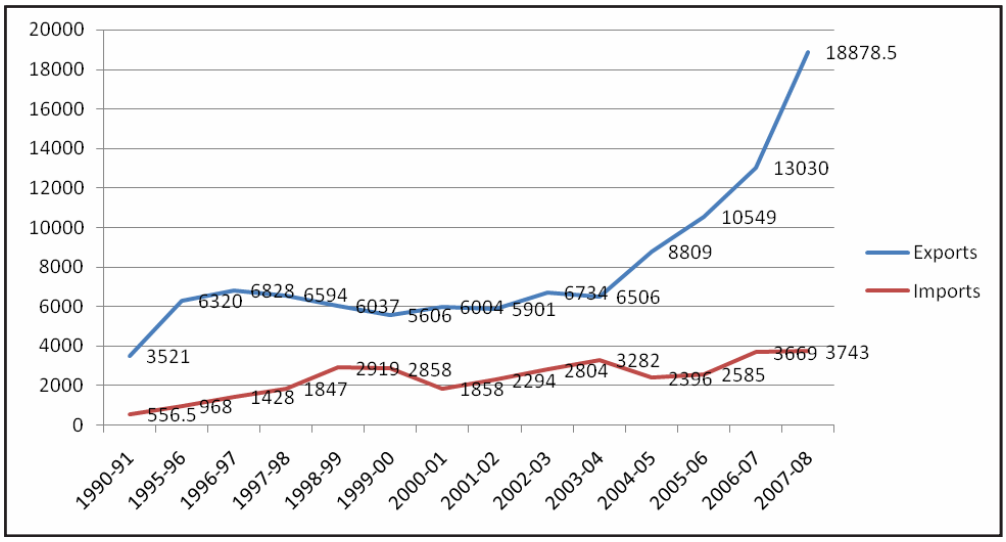
(US$ million)

Year	Agricultural		% to total	
	Exports	Imports	Exports	Imports
1990-91	3521	556.5	19.4	2.3
1995-96	6320	968.0	19.8	2.6
1996-97	6828	1428	20.4	3.7
1997-98	6594	1847	18.8	4.5
1998-99	6037	2919	18.2	6.9
1999-00	5606	2858	15.2	5.8
2000-01	6004	1858	13.5	3.7
2001-02	5901	2294	13.5	4.5
2002-03	6734	2804	12.8	4.6
2003-04	6506	3282	11.7	4.8
2004-05	8809	2396	10.5	3.5
2005-06	10549	2585	10.2	2.5
2006-07	13030	3669	10.3	2.9
2007-08	18878.5	3743	11.6	2.3

Source: Economic Survey 2003-04 to 2009-10 GoI

It can be seen from table 6.1 that agricultural exports have declined to 11.6 per cent in 2007-08 from 19.4 per cent in 1990-91. During the same period agricultural imports have remained constant at 2.3 per cent.

Fig.23 : Agricultural exports and imports during 1990-91 to 2007-08



Commodity wise Agricultural Imports of India

Commodity wise Agricultural Imports of India during 2001-02 to 2003-04 is indicated in table 6.2.

Table 6.2 Commodity wise agricultural imports during 2001-02 to2003-04

(in million US Dollar)

Item	2001-02	% of agri imports	2002-03	% of agri imports	2003-04	% of agri imports
Cereals	18.2	0.8	24.5	0.9	15.9	0.5
Pulses	662.6	28.9	565.6	20.2	449.9	13.7
Milk and cream	1.8	0.1	2.0	0.1	19.3	0.6
Cashew nuts	90.4	3.9	256.1	0.1	290.6	8.9
Fruits and nuts	158.7	6.9	132.6	4.7	150.2	4.6
Sugar	6.8	0.3	6.8	0.2	9.2	0.3
Oil seeds	0.3	0.0	2.4	0.1	2.5	0.1
Vegetable oils	1356.6	59.1	1814.2	64.7	2344.7	71.4
Agri imports	2294.4	100.00	2804.1	100.00	3282.2	100.00

Source: Economic Survey 2003-04, GoI

It can be seen from table 6.3 that maximum share in imports was of vegetable oil (71.4 per cent), followed by pulses (13.7 per cent) and cashew nuts (8.9) in 2003-04. The share of these items increased over the years.

Fig 24 : Commodity wise agricultural imports in India during 2001-02

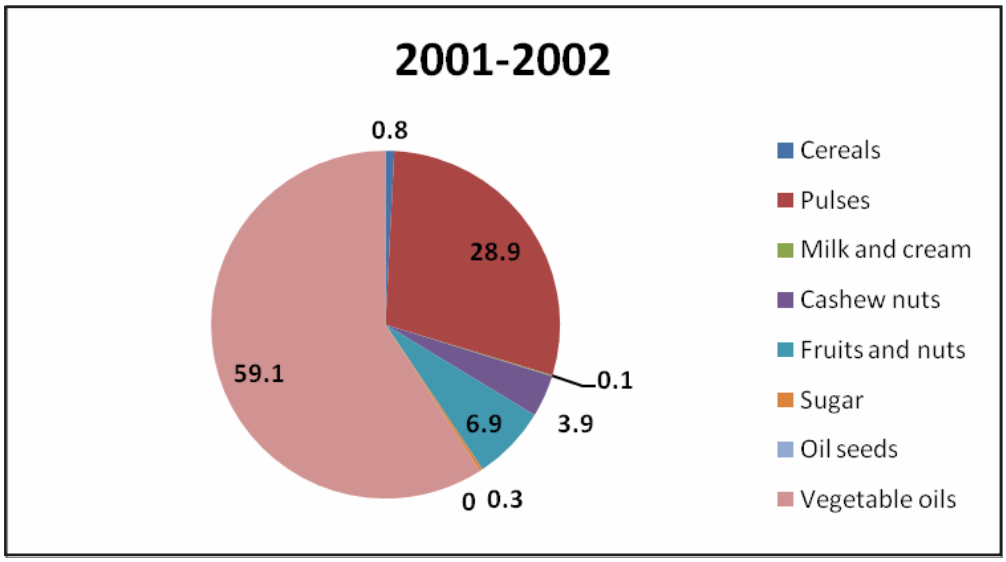


Fig 25 : Commodity wise agricultural imports in 2002-03

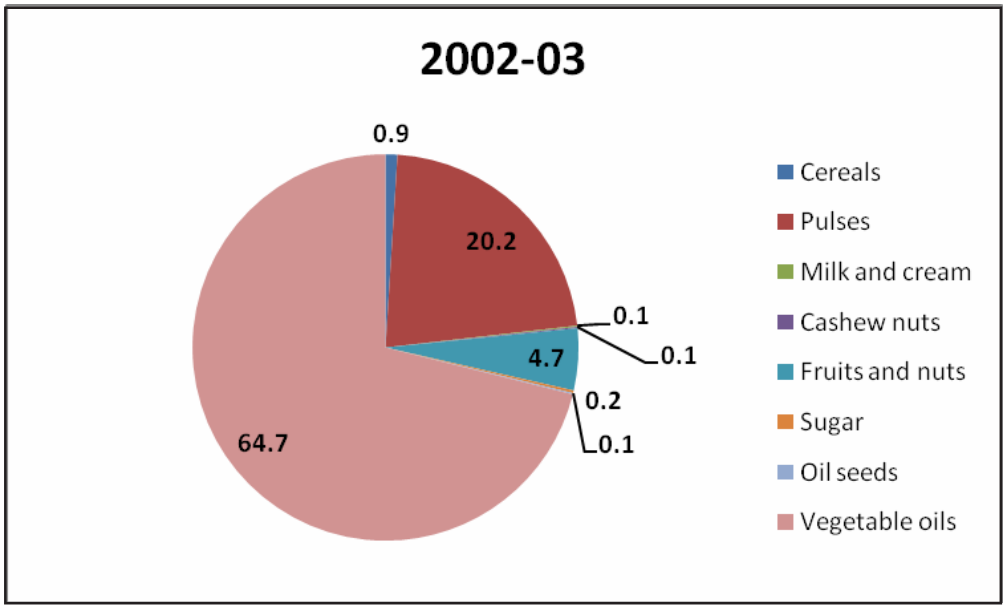
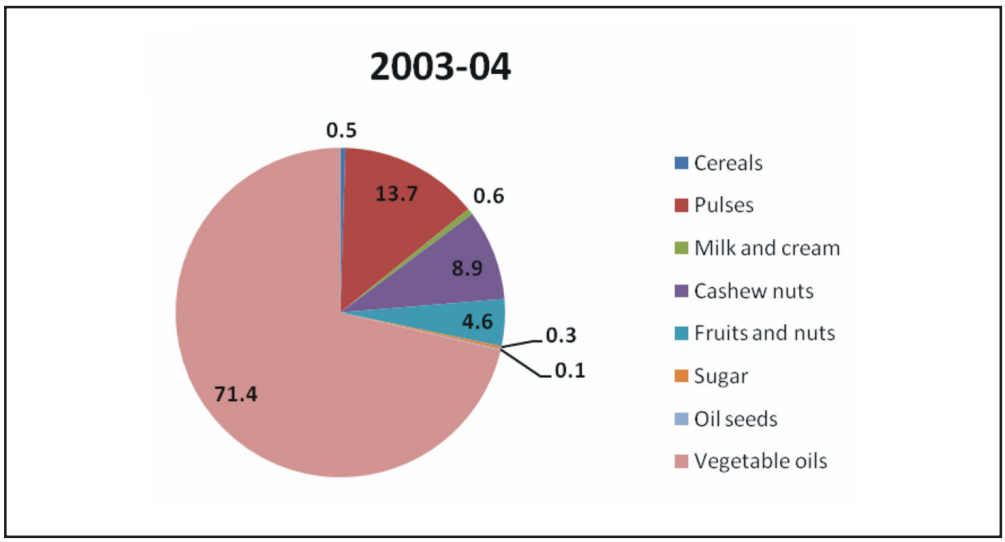


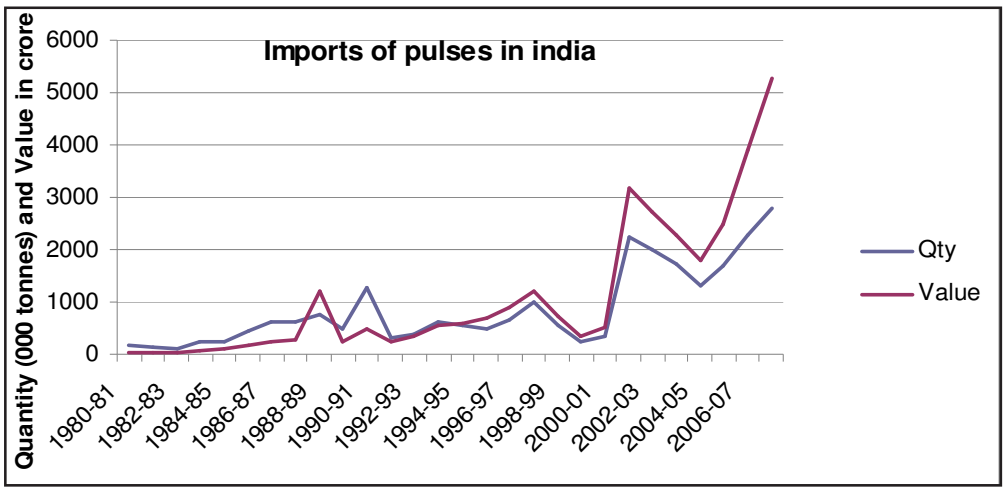
Fig. 26 : Commodity wise agricultural imports in 2003-04



Imports of Pulses in India

Once an exporter, India is presently one of the largest importers of pulses. India has followed a liberal policy towards the import of pulses during the last two decades. The pulses import was placed under the Open General License in 1979, allowing anyone to import pulses in to India without any approval or restrictions. Because of our domestic production is short of demand, India is a regular importer of pulses. For fulfilling domestic needs, Govt. allowed duty free imports from June 8, 2006. Imports of pulses in India during1980-81 to 2007-08 is indicated in **Annexure-8**.

Fig.27



Trend in Imports

Both quantity and value of imports of pulses show an upward trend. There had been fluctuations in the quantity imported, during 1998-99 to 2000-2001.The variation in imports of pulses can be attributed to the fact that the status of domestic demand, availability of pulses in international market and value of pulses too has a bearing over the quantity imported. In recent years, there has been a steep increase in value of pulses imported.

Country wise Imports of Pulses

Country wise imports of pulses during 2002-03 to 2006-07 are indicated in table 6.3.

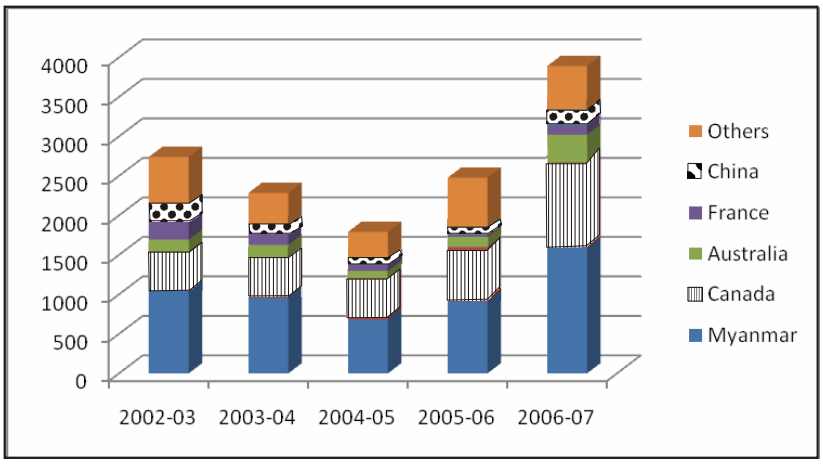
Table 6.3 Country wise Imports of Pulses in India during 2002-03 to 2006-07

(Value Rs crore)

Country	2002-03	% to total	2003-04	% to total	2004-05	% to total	2005-06	% to total	2006-07	% to total
Myanmar	1044.62	38.11	956.99	41.95	679.04	37.89	913.29	36.86	1594.58	40.97
Canada	486.08	17.73	499.96	21.85	518.55	28.93	673.43	27.18	1063.96	27.34
Australia	164.01	5.98	170.12	7.43	95.67	5.34	141.88	5.73	363.76	9.35
France	294.39	10.74	144.78	6.33	84.26	4.70	31.25	1.26	122.05	3.14
China	137.44	5.01	83.11	3.63	49.58	2.77	81.88	3.31	182.28	4.68
Others	614.51	22.42	429.90	18.19	365.03	20.37	635.40	25.65	565.28	14.52
Total	2741.05	100	2288.28	100	1792.13	100	2477.29	100	3892.00	100

Source: Indiastats. Com

Fig.28 : Country wise Imports of Pulses during 2002-03 to 2006-07



Country Wise Share in Imports

Myanmar accounted for maximum share (38.11 per cent) in total value of imports in 2002-03. The share again went up to 40.97 per cent in 2006-07.Minimum share of total imports was constituted by China. Her share stood at 5.10 per cent in 2002-03 and 4.68 per cent in 2006-07. Canada and Australia represented 27.34 per cent and 9.35 per cent in 2006-07.

Export of Pulses by India

Although domestic production of pulses is less than requirement, India is importing pulses to meet the deficit. India is also exporting pulses albeit in an insignificant quantity. Chana, masur and tur exported in small quantities. Export of pulses by India during 1992-93 to 2007-08 is indicated in table 6.4.

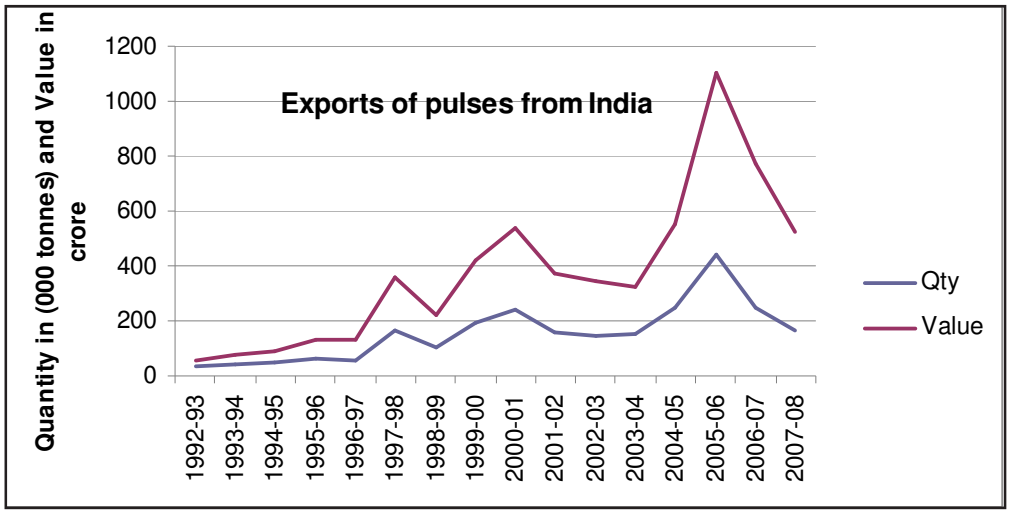
Table 6.4 Exports of Pulses by India during 1992-93to 2007-08

Period	Quantity(in 000 tons)	Value (Rs crore)
1992-93	34.31	53.44
1993-94	43.6	73.59
1994-95	50.51	90.41
1995-96	61.36	131.91
1996-97	55.22	131.58
1997-98	168.05	360.89
1998-99	104.10	223.03
1999-00	194.18	419.56
2000-01	244.08	537.08
2001-02	161.64	369.13
2002-03	148.08	345.02
2003-04	150.99	322.57
2004-05	246.00	553.81
2005-06	**444.61**	**1102.62**
2006-07	250.70	773.00
2007-08	163.67	527.00

Source: DGCI, Kolkata

It could be seen from table 6.4 that there was an increasing trend of India's exports of pulses from 34.31 thousand tons in 1992-93 to 163.67 thousand tons in 2007-08. India's record export was attained at 444.61 thousand tons in 2005-06.

Fig. 29



In the international pulse market, the speciality of India is **export of Masur.** During the past few years, demand of Masur in international market has increased. Indian Masur has earned a name and position in international pulse market. Nepal and Syria account for the largest shares of Indian Masur imports, followed by Canada and Turkey.

Due to rising consumption, inadequate domestic production to meet the rising demand, increasing prices, the GoI banned export of pulses from 22 June 2006.

CHAPTER 7

Constraints and Policies

Constraints in production, processing, marketing and international trade in pulses and possible strategies suggested are discussed in this chapter.

Constraints in Production and Productivity

Area, production and productivity of pulses are stagnant over the years. Area is more or less static at 23 million ha., while production is hovering around 15 million tonnes with productivity 622 kg/ ha., which is very low compared to best in class yield of around 1908 kg/ ha in Canada and USA. The field study observed that yield is affected by the vagaries of monsoon, poor quality and non availability of approved HYV seeds, and low seeds replacement rate.

Pulses were cultivated mostly in rainfed conditions, where moisture stress is enormous. Lack of irrigation, dependence on rains, cultivation of the pulses on the marginal/ sub marginal/ inferior/ poor lands in terms of soil quality, deficiency in nutrition are some of the factors responsible in low yield. Besides, **pulses are energy rich crops but are cultivated largely under conditions of energy starvation,** resorting to low yield.

About 80 per cent of sample farmers raised traditional varieties of pulses. Farmers were using local varieties of seeds, mostly their own. Since the seeds were used over a longer period, their productivity was lesser in comparison to the improved/new seeds. Although Tur Dal Board recommends seeds replacement in every 3 years, farmers continue to use seeds grown in the farm year after year. Most of the farmers prefer to use their own seeds, seeds replacement rate was low.

The sample farmers were very seldom following the exact and systematic package of recommended practices like weeding, application of pesticide / fertilizer etc leading to low productivity. Farmers have hardly any interest in cultivation of pulses.

The Indian Institute of Pulses Research, Kanpur has been carrying out pioneering research in the field of pulses **(Annexure 5)**. However, the lab to land transfer of technology has been slow. The new

technologies have not reached the farmers in a meaningful way.

Like rice and wheat, importance is not given to study the problems and constraints relating to pulses production. **Pulses are still relegated to an inferior crop.**

The per capita consumption of pluses in India declined from 69 grams/ day in 1960-61 to 51 grams/day in 1970-71 and **36 grams/day in 2007-08.** For India the World Health Organisation (WHO) recommends the consumption of 80 grams/capita of pluses/day.

As per recommendations of World Health Organization (WHO), India will require 38 MT pulses by 2017-2018. With a focused and integrated approach, India has the potential to produce 37 MT of pulses. To bridge the gap between demand and supply of pulses, India needs manifold increase in pulse production.

Policies for increasing Production

Field study revealed that production may be increased by way of (i) cultivating in rice fallows, (ii) growing short duration varieties, (iii) adopting relay and inter cropping, (iv) preventing /minimizing post harvest losses and (v) storing pulses at optimum humidity conditions.

There is an urgent need of higher yielding pulses varieties to keep pace with the demand of increasing population. According to Indian Institute of Pulses Research, Kanpur, the production of pulses can be tremendously increased if traditional and old varieties are replaced by high yielding improved varieties.

The supply of quality seeds in adequate quantity, in time and at reasonable prices to the farmers is the need of the hour. The seeds production as well as distribution network has to be stronger so as to cater to the demand of the farmers.

Since the soil quality and climatic condition vary from place to place, the seeds suitable for one area may not be suitable for another area. There comes the need for the development and distribution of specific variety of seeds for specific areas. The development and distribution of seeds suitable for local conditions through the seeds village programs will go a long way in solving the problem.

Enhancement of seeds replacement rate could be major thrust through

supply of certified seeds. Disease and drought resistant varieties of seeds suitable for different climates/soils, improvement in the harvest and post- harvest technology will boost the production of pulses.

The supply of seeds - nucleus, breeder, foundation and certified will have to be increased. A village level seeds Banks run by SHGs could solve this problem to some extent.

Adoption of recommended practices for higher production and productivity has to be done the right way.

The Indian Institute of Pulses Research (IIPR), Kanpur is of the opinion that the available technology has the potential to double the present level productivity provided the technology gap between lab and land is reduced. Farmers Technology Transfer Fund (FTTF) operationalised by NABARD for promoting transfer of technology for enhancing production and productivity in agriculture and farm related activities can be used for the purpose. Such intervention will result in perceptible impact at the field level.

In Bidar district of Karnataka State Krishi Vikas Kendra (KVK), Bidar has developed a technology of transplanting in Arhar/Tur for higher production, which has a yield potential of 12-14 quintals/acre under rainfed conditions and 16-18 quintals/acre under irrigated conditions. For higher yield this can be used by the farmers on experimental basis. The research results should be carried to the doors of farmers and they should be convinced about the enhanced profitability of pulses grown through this technology. This can be popularize through Farmers Clubs.

The extension mechanism needs to be strengthened by involvement of scientists from Agriculture Universities. Help line phone numbers with subject experts may be made available to the Farmers Clubs for guidance and redressal of their problems at affordable cost.

Providing irrigation can lead to increase in yields. Irrigation requirements for pulses are much lower than that for other crops and could be provided through sprinklers.

NABARDs program of Capacity Building for Adoption of Technology (CAT) could be an important tool for exposure visits of interested farmers.

Farmers should be encouraged to adopt a package of agronomic practices and to adopt Integrated Pest Management (IPM) measures. Farmer's Clubs could be leveraged for propagation of latest agronomic practices.

GoI has finalized action plan to improve domestic production by bringing all pulses promotion schemes under single window - National Food Security Mission (NFSM). In a two pronged strategy, the GoI has decided to merge the 2 schemes on pulses on the one hand, and on the other, bring all the districts in the 14 major pulses producing States under the National Food Security Mission.

The GoI has proposed to withdraw the area of pulses development under the Integrated Scheme of Oil seeds, pulses, oil palm and Maize (ISOPOM) and put the responsibility under the NFSM. All the 437 districts in 14 major pulses growing States will be covered under the NFSM that seeks to rise out put by 2 million tonnes by 2011-12.

Constraints in Processing of Pulses

The sample processing units appraised that cent per cent of pulse-mills are still running in old traditional system. This causes higher milling losses in the form of broken and powder with lower recovery of dal.

The selected processing unit stated that average capacity utilization of the processing units was 70 per cent because of non availability of pulses and the pulses processing is a seasonal activity.

The major problems of present day units are low recovery and high cost of milling because pulse processing units are still running on old traditional system as against modern, sophisticated processing units of Canada, Australia, Germany and Spain.

Sample units were using batch process of pulses. It involves excessive material handling resulting in pulse loss. The units were preparing a lot of 50-60 quintals of pre treated/ conditioned pulses at a time for milling and after producing dal, the same process was repeated.

The sample units were using sun drying which reduces the capacity utilization of the units during rainy season.

As the pulses are aggregated from large number of players, they differ in their quality, variety and size. There is no mechanism to grade and

standardize pulses, leading to under recovery.

The sample units expressed their concern on uninterrupted supply of electricity, dearth of water availability etc..

The establishment of dal mill unit involves huge investment in block and working capital. The working capital, which constituted around 85 to 90 per cent of their overall cost of operations, was the most important component of processing units. The sample units had availed financial assistance from informal sources to procure the pulses. The rate of interest on these informal borrowings was as high as 15 -20 per cent per annum.

Policies for Developing Processing Units

The uninterrupted supply of raw material is a prerequisite for running any unit. Unless resorted to imports, the available production is not adequate for continuous operations round the year in processing pulses. Hence efforts should be made to ensure supply of raw material throughout the year.

Central Food Technological Research Institute, Mysore has developed the conditioning technique to loosen the husk without resorting to sun drying, oil and water application. This step has been mechanized with the introduction of conditioning units. Use of conditioning technique developed by CFTRI, Mysore can be propagated through NABARDs Farm Innovation and Promotion Fund (FIPF).

To prevent post harvest losses pulses need to be stored at optimum humidity conditions. For improving recovery of pulses, there is a need to standardize the pre treatment/conditioning process.

Sample units were using batch process of dal involving excessive material handling. These result in pulse loss. The units were preparing a lot of 50-60 quintals of pre treated/ conditioned pulses at a time for milling and after producing dal, the same process was repeated. This can be reduced by introducing continuous type processing system.

The present losses can be minimized to a great extent by the use of improved dal mills. These dal mills are highly versatile and energy efficient. PKV Akola, CFTRI Mysore, GBPUAT Pantnagar, CIAE Bhopal, IIPR Kanpur, TNAU Coimbatore and IARI New Delhi in the country

have developed modern improved dal mills. The improved dal mills have dehusking efficiency of about 95 per cent and the yield of split pulses is about 80-85 per cent. Concerted efforts towards popularization of mini -dal mills may be made.

Availability of infrastructure facilities like uninterrupted electricity and water supply, better road connectivity and telecommunication would go a long way in enhancing the viability of dal mills.

Marketing of un-processed and processed Pulses

Pulses are not cleaned so as to remove dust, mud and other impurities. This in turn is affecting the market price.

As the pulses are aggregated from large number of players, they differ in their quality, variety and size, leading to low price. There is no mechanism to grade and standardize pulses.

Almost 92 per cent of sample farmers preferred to sell the produce after the harvest. As they had to meet the immediate requirements, they are unable to hold the produce to get better price. Unfortunately, the higher price paid by the consumer does not reach the farmers.

Due to lack of information on the prevailing trend in production, prices the farmers sold their produce at a much lower price.

Due to inadequate transport facilities at the villages, the farmers sold the pulses to the traders directly from their farm or at villages, which offered the lesser price than prevailing at the nearby/district markets.

Like other branded products such as basmati rice, edible oils, except besan no branded product of any pulse is popular at present.

The shortage of Tur in global market caused prices to soar. Due to sharp rise in tur dal consumers are moving to a lower grade of Tur dal. People are switching to cheaper pulses like matar/vatana or chana.

Policies in Marketing

Farmers may directly market Pulses to the millers, consumers etc.. Direct marketing enables farmers, millers and other bulk buyers to economize transportation cost and improve the price realization.

Farmers have experimented in direct marketing to the consumers/ millers through Apni Mandi in Punjab and Haryana as well as Rythu Bazars in Andhra Pradesh.

Introduction of market intervention measures is essential to form buffer stock so that the volatility in prices is not left open to the machination of traders. Procurement of pulses from the farmers during the peak marketing season at a support/procurement prices and channelizing the produce through the public distribution system (PDS) will also facilitate in protecting the interest of both the consumers as well as the farmers.

In order to provide an alternative marketing system and to ensure remunerative prices to the farmers, the produce of the farmers should be procured by an integrated agency eliminating the middlemen. This would ensure reasonable returns to the farmers. The consumers too would get pulses at reasonable rates.

GoI should help the pulse growers by announcing attractive Minimum Support Price (MSP). Support prices should be declared before sowing. Pulses should be procured from the farmers at support price at the time of harvest.

Taxes and various cesses that are imposed on pulses need to be urgently abolished and replaced by value added tax (VAT).

Market reforms are needed to even out prices so that farmers are able to get a better deal. Linking farmer groups directly to processors and organized retailers needs to be taken up. This would make the agri-system much more efficient by sharing experiences between the farmers, processors, organized retailers and consumers.

Proposal for establishment of electronic mandis by State Minister for Agriculture, GoI, in Maharashtra, Bihar, Odisha and Tamil Nadu will provide a new direction to sell the produce in these mandis directly/ without middleman.

As majority of the population spends nearly half its income on food, increasing prices of pulses are putting the common man in severe hardship. The Estimates Committee asked the Govt. to bring a new legislation to control the retail prices of pulses. There is a demand that the Essential Commodities Act be implemented in full measure.

Of the major pulses, chana is traded on the local commodity, where as tur and urad have been banned since early 2007. A parliamentary panel has suggested that futures trading should be banned in case of pulses till the country becomes self sufficient in pulses. The Estimate Committee asked the Govt. to bring a new legislation to control the retail prices of essential commodities like pulses, rice, wheat, sugar, milk, Edible oil and vegetables.

Constraints and Policies of International Trade in Pulses

Due to mismatch between supply and demand of pulses the country is dependent heavily on imports to meet the domestic demand.

Limited availability of pulses in international markets is a major supply constraint leading to abnormal price rise. Imports were not an option as limited quantities were available internationally. The world's pulses supply and demand is out of balance.

The demand supply mismatch in global pulses in 2007-08 has increased prices from early 2009.

The high dependence on imports for essential source of protein for the large vegetarian population is a matter of serious concern. Serious efforts are needed to address the issue.

The Free Trade Agreement (FTA) will lead to complete slashing of import duties in 80 per cent of the nearly 5000 items that India broadly trades with Association of South East Asian Nations (ASEAN) (India, China, Japan, Korea Republic, Singapore, Hongkong). Govt. should remove all hurdles on private trade and allow the private sector to freely import, store and process pulses.

Annexure-1

Area, production and yield of total pulses during 1950-51 to 2007-08 in India

Year	Area (Million Ha)	Production (Million Tons)	Yield (Kg/Ha)	% coverage under irrigation
1950-51	19.09	8.41	441	9.4
1951-52	18.78	8.42	448	9.7
1952-53	19.84	9.19	463	9.8
1953-54	21.73	10.62	489	9.2
1954-55	21.91	10.95	500	8.8
1955-56	23.22	11.04	476	8.4
1956-57	23.22	11.55	495	7.3
1957-58	22.54	9.56	424	9.1
1958-59	24.31	13.15	541	8.4
1959-60	24.83	11.80	475	8.5
1960-61	23.56	12.70	539	8.0
1961-62	24.24	11.76	485	8.1
1962-63	24.27	11.53	475	8.9
1963-64	24.18	10.07	416	8.9
1964-65	23.88	12.42	520	9.2
1965-66	22.72	9.94	438	9.4
1966-67	22.12	8.35	377	10.9
1967-68	22.65	12.10	534	8.7
1968-69	21.26	10.42	490	9.8
1969-70	22.02	11.69	531	9.4
1970-71	22.54	11.82	524	8.8
1971-72	22.15	11.09	501	8.8
1972-73	20.92	9.91	474	8.1
1973-74	23.43	10.01	427	7.9
1974-75	22.03	10.02	455	8.1
1975-76	24.45	13.04	533	7.9

Year	Area (Million Ha)	Production (Million Tons)	Yield (Kg/Ha)	% coverage under irrigation
1977-78	23.50	11.97	510	7.1
1978-79	23.66	12.18	515	7.9
1979-80	22.26	8.57	385	8.8
1980-81	22.46	10.63	473	9.0
1981-82	23.84	11.51	483	8.5
1982-83	22.83	11.86	519	8.2
1983-84	23.54	12.89	548	7.5
1984-85	22.74	11.96	526	7.9
1985-86	24.42	13.36	547	8.5
1986-87	23.16	11.71	506	9.6
1987-88	21.27	10.96	515	9.4
1988-89	23.15	13.85	598	9.3
1989-90	23.41	12.86	549	10.0
1990-91	24.66	14.26	578	10.5
1991-92	22.54	12.02	533	10.7
1992-93	22.36	12.82	573	10.4
1993-94	22.25	13.30	598	11.3
1994-95	23.03	14.04	610	12.7
1995-96	23.70	13.27	552	12.9
1996-97	22.45	14.24	635	12.7
1997-98	22.87	12.98	567	11.3
1998-99	23.50	14.91	634	12.1
1999-00	21.12	13.42	635	16.1
2000-01	20.35	11.08	544	12.5
2001-02	22.01	13.37	607	13.3
2002-03	20.50	11.13	543	14.4
2003-04	23.46	14.91	635	13.6
2004-05	22.76	13.13	577	13.9
2005-06	22.39	13.39	598	15.0
2006-07	23.19	14.20	612	NA
2007-08	23.86	15.12	622	NA

Source : Directorate of Economics and Statistics, Dept. of Agriculture and Co-operation, Ministry of Agriculture, GOI

Annexure-2

Area, Production and yield of Chana in India during 1950-51 to 2007-2008

Year	Area (Million Ha)	Production (Million Tons)	Yield (Kg/Ha)	% coverage under irrigation
1950-51	7.57	3.65	482	12.5
1951-52	6.83	3.39	496	15.1
1952-53	7.26	4.21	580	14.6
1953-54	7.97	4.83	606	14.0
1954-55	9.25	5.62	608	12.8
1955-56	9.78	5.42	554	12.1
1956-57	9.67	6.23	644	10.8
1957-58	9.09	4.89	538	12.5
1958-59	10.08	7.02	697	12.0
1959-60	10.33	5.62	544	12.4
1960-61	9.28	6.25	674	11.9
1961-62	9.57	5.79	605	12.2
1962-63	9.19	5.3	583	13.7
1963-64	9.35	4.50	481	13.7
1964-65	8.87	5.78	651	15.8
1965-66	8.02	4.22	527	16.4
1966-67	8.00	3.62	453	18.8
1967-68	8.26	5.97	723	15.6
1968-69	7.11	4.31	607	18.8
1969-70	7.75	5.55	715	17.3
1970-71	7.84	5.20	663	15.6
1971-72	7.91	5.08	642	15.0
1972-73	6.97	4.54	651	15.6
1973-74	7.76	4.10	528	15.8
1974-75	7.04	4.02	570	17.8
1975-76	8.32	5.88	707	16.5

Year	Area (Million Ha)	Production (Million Tons)	Yield (Kg/Ha)	% coverage under irrigation
1976-77	7.97	5.42	680	15.2
1977-78	7.97	5.41	678	14.7
1978-79	7.71	5.74	745	15.6
1979-80	6.99	3.36	481	18.6
1980-81	6.58	4.33	657	20.6
1981-82	7.87	4.64	590	17.9
1982-83	7.40	5.29	715	15.6
1983-84	7.16	4.75	663	14.5
1984-85	6.91	4.56	661	14.8
1985-86	7.80	5.79	742	15.6
1986-87	6.98	4.53	649	19.4
1987-88	5.77	3.63	629	19.2
1988-89	6.81	5.13	75	18.3
1989-90	6.47	4.22	652	21.0
1990-91	7.52	5.36	712	20.5
1991-92	5.58	4.12	739	24.2
1992-93	6.45	4.42	684	22.0
1993-94	6.36	4.98	783	24.0
1994-95	7.54	6.44	853	25.3
1995-96	7.12	4.98	700	26.0
1996-97	6.85	5.57	813	25.1
1997-98	7.56	6.13	811	21.8
1998-99	8.47	6.80	803	21.0
1999-00	6.15	5.12	833	29.1
2000-01	5.19	3.86	744	30.9
2001-02	6.42	5.47	853	30.4
2002-03	5.91	4.24	717	32.1
2003-04	7.05	5.72	811	31.0
2004-05	6.71	5.47	815	31.4
2005-06	6.93	5.60	808	31.1
2006-07	7.49	6.33	845	NA
2007-08	7.58	6.91	780	NA

Source : Directorate of Economics and Statistics, Dept. of Agriculture and Cooperation, Ministry of Agriculture, GoI.

Annexure-3

Per capita net availability of food grains (per annum) in India during 1951 to 2007

(kgs/year)

Year	Rice	Wheat	Other cereals	Cereals	Gram	Other pulses	Food grains
1951	58.00	24.00	40.00	122.00	8.20	22.10	144.10
1952	58.00	21.10	40.00	119.10	7.30	21.60	140.70
1953	60.60	22.80	44.30	127.70	8.80	22.90	150.60
1954	70.90	21.20	49.60	141.70	10.00	25.40	167.10
1955	65.60	21.30	49.20	136.10	11.30	25.90	162.00
1956	68.70	22.50	40.70	131.90	10.60	25.70	157.60
1957	70.40	26.10	40.50	137.00	12.00	26.20	163.20
1958	60.20	24.30	43.40	127.90	9020	21.30	149.20
1959	69.70	28.60	45.30	143.60	13.00	27.30	170.90
1960	68.80	28.60	43.20	140.60	10.10	24.00	164.60
1961	73.40	28.90	43.60	145.90	11.00	25.20	171.10
1962	74.20	30.70	40.70	145.60	10.00	22.60	168.20
1963	68.20	28.90	43.10	140.20	9.00	21.80	162.00
1964	73.70	33.00	40.10	146.80	7.40	18.60	165.40
1965	76.70	34.20	41.90	152.80	9.30	22.50	175.30
1966	59.10	34.80	37.50	131.40	6.70	17.60	149.00
1667	56.20	33.00	42.80	132.00	5.60	14.50	146.50
1968	67.20	35.10	45.60	147.90	9.00	20.50	168.40
1969	69.50	36.70	39.00	145.20	6.40	17.30	162.50
1970	69.40	37.40	40.40	147.20	8.00	18.90	166.10
1971	70.30	37.80	44.30	152.40	7.30	18.70	171.10
1972	72.40	46.10	34.90	153.40	7.00	17.20	170.60
1973	62.80	43.10	33.00	138.90	6.10	15.00	153.90
1974	69.50	39.70	40.60	149.80	5.40	14.90	164.70
1975	58.00	40.90	34.60	133.50	5.20	14.50	148.00
1976	68.50	29.10	39.20	136.80	7.40	18.50	155.30

Year	Rice	Wheat	Other cereals	Cereals	Gram	Other pulses	Food grains
1977	61.60	41.80	37.60	141.00	6.70	15.80	156.80
1978	71.60	46.10	36.50	154.20	6.50	16.60	170.80
1979	73.10	48.30	36.20	157.60	6.80	16.30	173.90
1980	60.80	46.40	31.70	138.90	3.90	11.30	150.20
1981	72.20	47.30	32.80	152.30	4.90	13.70	166.00
1982	70.50	46.70	34.60	151.80	5.10	14.30	166.10
1983	62.00	52.70	30.40	145.10	5.70	14.40	159.50
1984	72.20	51.40	36.10	159.70	5.00	15.30	175.00
1985	68.90	50.60	32.10	151.60	4.70	13.90	165.50
1986	77.40	55.10	25.80	158.30	5.90	16.00	174.30
1987	75.20	57.60	25.90	158.70	4.50	13.30	172.00
1988	68.70	56.30	25.10	150.10	3.50	13.30	163.40
1989	78.50	57.00	29.30	164.80	4.90	15.30	180.10
1990	77.40	48.40	31.70	157.50	3.90	15.00	172.50
1991	80.90	60.00	29.20	171.00	4.90	15.20	186.20
1992	79.20	57.90	21.50	158.60	3.70	12.50	171.10
1993	73.40	51.20	31.60	156.20	3.90	13.20	169.40
1994	75.70	58.20	24.50	158.40	4.30	13.60	172.00
1995	80.30	63.00	23.70	167.00	5.40	13.80	180.80
1996	74.60	64.30	22.60	161.50	4.10	12.00	173.50
1997	78.10	65.40	26.60	170.10	4.50	13.50	183.60
1998	73.10	55.30	22.80	151.20	4.90	12.00	163.20
1999	74.20	59.20	23.10	156.70	5.30	13.30	170.00
2000	74.30	58.40	21.50	154.30	3.90	11.60	165.90
2001	69.50	49.60	20.50	141.00	2.90	10.90	151.90
2002	83.50	60.80	23.10	167.40	3.90	12.90	180.40
2003	66.20	65.80	17.10	149.10	3.10	10.60	159.70
2004	71.30	59.20	25.30	155.80	4.10	13.10	168.90
2005	64.70	56.30	21.70	142.70	3.90	11.50	154.20
2006	72.30	56.30	22.10	150.70	3.90	11.80	162.50
2007	71.80	57.00	20.80	149.60	4.30	10.70	160.40

Source: www. Indiastat.com/ MoA, GoI.

Annexure - 4

Major Programs/ Policies Introduced during Five Year Plans

Third Five Year Plan (1961 – 1965)	**Fourth Five Year Plan (1969 - 1974)**
AICPRP was established All India coordinated varietal trials were made Breeding suitable varieties for multiple cropping Breeding of uniformly ripening varieties Breeding of suitable varieties of Urad for mixed cropping in north India Breeding of disease resistant varieties	Intensive Pulse Development Program (IPDP) was launched Campaign launched about package of practices Mini kit program for non IPDP areas Extension of pulses areas by catch – cropping, inter – cropping & mixed cropping
Fifth Five Year Plan (1974 -1979)	**Sixth Five Year Plan (1980 - 1985)**
Continuation and intensification of IPDP AICRP stepped up Suitable breeding varieties Standardization of technique for fertilizer application Development of more effective agronomic practices Special importance on processing of pulses and modernization of dal milling industry	Introduction of pulses in irrigated farming Bringing additional area under pulses cultivation Multiplication & use of improved pulses seeds Improved post harvest technology Organisation of pulses crop village in various blocks
Seventh Five Year Plan (1985 - 1990)	**Eighth Five Year (1992 -1997)**
Adoption of plant protection measures Launching of centrally sponsored National pulses Development program (NPDP)	Pulses brought under technology mission Intensification of NPDP by bringing in additional area, use of new variety seeds, technology & the special food grains production program on pulses

Ninth Five Year Plan (1997 - 2002)	**Tenth Five Year Plan (2002 -2007)**
Continuation of strategies introduced in 8 th 5 year plan Continuation of NPDP	More emphasis on NPDP by taking into consideration all the aspects of production & post harvest management Launching of Integrated Scheme of Oil seeds, pulses & Maize (ISOPOM)
Eleventh Five Year plan (2007 - 2012)	**Technology Mission on Pulses Development Program**
Launching of National Food Security Mission (NFSM) to ensure food security by producing adequate amount of pulses **Seeds** Production of breeder seeds Purchase of breeder seeds of pulses from ICAR Production of Foundation seeds Distribution of certified seeds Integrated Nutrient Management Integrated Pest Management (IPM) Demonstrations of technologies and practices developed by ICRIST to enhance production of pulses	In order to increase the area & production of pulses, a centrally sponsored National Pulses development Program (NPDP) was launched in different states in mid eighties with financial aid of the GoI. The program includes enhancing production & productivity of 6 major pulse crops i.e. Chana, Tur/Arhar, Mung, Urad, Pea & Masur. Under NPDP emphasis was on all components, which will help in increasing the production & yield of pulses. Major components of the program were: Seed village component Distribution of certified seeds Purchase of breeder seeds & production of foundation seeds Distribution of seeds minikits Integrated Pest Management (IPM) demonstrations Training

The promotional programs / and policies could not break-through in the production of pulses. Pulses are still relegated to an inferior crop.

Annexure-5

Other Measures/Steps Taken for Development of Pulses in the country

A number of initiatives have been taken for the development of the pulses in the country.

Minimum Support Price : To ensure remunerative price for the farmers, every year, the Govt. announces the Minimum Support Price (MSP) for five major pulses i.e. Chana, Urad, Mung, Tur/arhar and Musar/lentils.

Liberal Imports : India has followed a liberal policy towards the import of pulses during the last 2 decades. The pulses import was placed under the open General License in 1979, allowing anyone to import pulses into India without any approval or restrictions. For fulfilling domestic needs, Govt. allowed duty free imports from June 8, 2006.

Research: Indian Institute of Pulses Research (IIPR), Kanpur established by the ICAR to carry out basic, strategic and applied research on major pulse crops namely Chana, Tur, Urad, Mung and Masur. Besides generating basic knowledge and material, the Institute also develops appropriate production and protection technologies, production and supply of breeder seeds of improved varieties, demonstration and transfer of technologies & strategic coordination of pulses research through wide net work of testing centers across the country.

Salient Research Achievements : IIPR, Kanpur in coordination with All India Coordinated Research Projects (AICRPs) had developed 27 high yielding and disease resistant varieties of Chana/chick pea, 20 Tur/pigeon pea, 17 Mug bean, 15 Urad, and 17 Masur/lentils.

Annexure-5 Contd.

The IIPR, Kanpur Developed Varieties of Pulses

Pulse	**Variety**	**Special features**
Chana	DCP 92-3	Yellowish small seeds. Tolerant to lodging, wilt resistant.
Masur	DPL 15 (priya)	Resistant to rust
	DPL 62 (Sheri)	Large seeds. Resistant to rust & wilt.
	IPL 406	Extra large seeds. Tolerant to rust.
	IPL 81 (Noori)	Large seeds. Tolerant to rust & wilt, early maturing.
Mug bean	PDM 11	Resistant to MYMV pod shattering
	PDM 54 (Moti)	Large seeds. Early maturity, multiple disease resistance
	IPM 99-125(Meha)	Early maturing, MYMV resistance
Urad bean	PDU 1 (Basant Bahar)	MYMV tolerant, good plant type
	IPU 94-1 (Uttara)	MYMV resistance, good plant type

Annexure–6

Processing Technology of Pulses

The processing of pulses is undertaken at 3 levels i.e. Primary, Secondary and Tertiary.

Primary processing consists mainly of production of cleaned and graded pulses, while secondary processing includes dehusking, splitting, polishing, turmeric coating and also packaged dal and powdered besan. Tertiary processing covers mainly preparation of roasted, fired dal and other associated dal products.

Milling

There are two types of conventional methods of milling pulses. They include the wet milling which covers cleaning of chaffs, dirt > soaking > mixing with red soil > conditioning > dehusking and splitting > separation and grading > dehusked and split pulses > bagging. Dry milling takes into account cleaning of chaffs and dirt > pitting > pre-treatment with oil > conditioning > dehusking and splitting the mixture of husk, broken & powder > grading > polishing > bagging.

Operations involved

Cleaning

Cleaning helps in removing the husk, dust from the pulses while grading is done to segregate the grain legumes of desired shape and size on a rotative type cleaner.

Pitting

An empty roller machine is used for cracking the husk layer and for scratching the clean pulses passing through it. This is done for loosening the husk from sticking to the cotyledons in order to facilitate subsequent oil penetration. Cracking and scratching of husk takes place mainly by friction between pulses as material is passed through narrowing clearance. During the operations, some of the pulses are dehusked and split is separated sieving.

Pre treatment with oil

The scratched or pitted material is passed through a screw conveyor and mixing of some edible oil. Pulses coming of the screw conveyor are kept out about 8-10 hours to diffuse oil.

Conditioning

In India food legumes are consumed mostly in the form of dal, the dehusked and split grains. A layer of gum between cotyledons or kernel and outer husk is present in pulses. This gum layer may be thin or thick which in turn governs the degree of adherence of the seed coat to the cotyledons. The nature of gum influences the adherence of husk to kernel while the amount of gum affects the duration and severity of the conditioning process. The main objective of the conditioning process is to loosen the husk to facilitate its separation from the kernel, thus reducing the milling losses. This process is done by several methods. Conditioning can be achieved by water treatment, hydrothermal treatment, use of salts and chemicals and use of heat alone. Insufficient conditioning results in incomplete loosening of husk. Therefore, greater abrasive/scouring forces are necessary for complete removal of husk. In India, pulses processing units are still running on old traditional system. This causes higher milling losses in the form of broken & powder with lower recovery of dal.

Dehusking

The conditioned grains are subjected to abrasive/scouring forces for removal of husk and for splitting of cotyledons into two equal halves. Dehusking and splitting are the most important unit operations of any milling process. Dehusking of pulses is generally carried in an abrasive roller mill. In some pulse milling plants, vertical stones-chakki is also used to dehusk and split the grains.

Splitting

For splitting of the dehusked and moistened grains vertical disk burr mill is used or the grains are allowed to fall on a hard cemented surface from sufficient height. Due to impact with hard surface the grains get split.

Polishing

This is performed to impart shine and luster to dal. For this desired quantity of edible oil and /water is mixed with dal by passing it through a screw conveyor. The presence of oil and water imparts desirable color and shine to milled pulses.

Annexure–7

Minimum support price of major pulses during 1975-76 to 2009-10

(Rs /quintal)

Year	Chana	Tur	Mung	Urad
1975-76	90	-	-	-
1976-77	95	-	-	-
1977-78	125	-	-	-
1978-79	140	155	165	-
1979-80	145	165	175	175
1980-81	-	190	200	200
1981-82	-	-	-	-
1982-83	235	215	240	230
1983-84	240	245	250	245
1984-85	250*	275	275	275
1985-86	260	300	300	300
1986-87	280	320	320	320
1987-88	290	325	325	325
1988-89	325	360	360	360
1989-90	421	425	425	425
1990-91	450	480	480	480
1991-92	500	545	545	545
1992-93	600	640	640	640
1993-94	640	700	700	700
1994-95	670	760	760	760
1995-96	700	800	800	800
1996-97	740	840	840	840
1997-98	815	900	900	900
1998-99	895	960	960	960
1999-00	1015	1105	1105	1105
2000-01	1100	1200	1200	1200
2001-02	1200	1320	1320	1320
2002-03	1200	1320	1330	1330
2003-04	1400	1360	1370	1370
2004-05	1425	1390	1410	1410
2005-06	1435	1400	1520	1520
2006-07	1445	1410	1520	1520
2007-08	1600	1590	1740	1740
2008-09	1730	2000	2520	2520
2009-10	1750	2300	2760	2520

Source : Ministry of Agriculture, GoI.

- Not Available

*for working out CAGR average of preceding and succeeding years price has been assumed as the same was not available.

Annexure–8

Imports of pulses in India during 1980-81 to 2007-08

Year	Qty (000 tons)	Value (Rs crore)
1980-81	172.96	29.76
1981-82	128.07	44.34
1982-83	102.36	36.68
1983-84	227.9	82.85
1984-85	235.39	100.7
1985-86	431.44	189.06
1986-87	624.79	233.66
1987-88	612.4	272.02
1988-89	755.56	1190.01
1989-90	469.9	228.35
1990-91	1273.43	481.17
1991-92	312.61	254.77
1992-93	382.62	334.38
1993-94	627.96	566.85
1994-95	554.08	593.37
1995-96	485.65	685.55
1996-97	654.79	890.34
1997-98	1008.15	1194.67
1998-99	563.53	708.81
1999-00	252.82	358.25
2000-01	350.57	500.06
2001-02	2232.29	3163.72
2002-03	1995.33	2741.05
2003-04	1725.51	2288.28
2004-05	1312.17	1792.13
2005-06	1692.52	2477.29
2006-07	2270.97	3892.00
2007-08	2791.10	5278.00

Source : DGCI, Kolkata