# Inclusiveness of Chickpea Value Chain in Andhra Pradesh

**Report Submitted to**

**International Crop Research Institute for the Semi-Arid Tropics**

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# DECLARATION

I do hereby declare that the dissertation entitled **"Inclusiveness of Chickpea value chain in Andhra Pradesh"** is an original and independent record of project work undertaken by me under the supervision of Mr P Parthasarathy Rao and Mr M Srinivas Rao at International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Patancheru, India, during the period of my study as a part of my summer internship.

Patancheru By

Date: 11 July, 2014 Shreya Kakkar

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## Abstract

Chickpea is emerging as an important pulse crop grown in black cotton soils of Andhra Pradesh. Area under Chickpea has been expanding due to its diversified usage. The objective of this study is to identify the factors that enabled Chickpea Revolution in Andhra Pradesh with a special focus on post-harvest issues like storage, transportation, and marketing. Improvements in productivity and subsequent effective marketing of chickpea produce in potential areas of Kurnool shows the success of CP revolution. This study employs a value chain approach to examine the factors that affect Chickpea production, value addition at each stage, and marketing of chickpea. The study confirmed that majority of the produce is being marketed by the famers which shows that the famer's marketed surplus is well integrated to the market. It was found that even though diversified value addition is done for chickpea and margins are high for finished products, due share in the consumer's rupee is not received by the farmers. The purpose is the development of Inclusive value chain to safeguard the interest of smallholder farmers, who now remain at risk of profiting the least from agricultural value chain development.

## Contents

## 1. Introduction

Chickpea is a very important pulse crop that grows as a seed of a plant named Cicer arietinum in the leguminous family. The Chickpea, also known as a garbanzo bean, ceci bean, sanagalu, chana, hummus and chickpea has an interesting fact behind its name. It's called Chickpea because it looks like baby chick. This pulse is estimated to be at least 7,500 years old and was originally cultivated at Mesopotamia and The eastern Mediterranean. Currently, it is grown in India, Middle East and various parts of Africa. It contains 25% proteins, which is the maximum provided by any pulse and 60% carbohydrates. It occupies third position in the list of the food legumes which are cultivated throughout the world (FAOSTAT). There are mainly two types of Chickpea produced i.e. Desi and Kabuli.

**Desi Chickpeas** are smaller, angular seeds with thick seed coats that range in colour from light tan and speckled to solid black. This type of Chickpea is mainly grown in India, Bangladesh, parts of Pakistan, Ethiopia, Mexico, and Iran. Desi Chickpeas are the most widely grown under dry land which is fairly drought tolerant, adapted to low rainfall areas and is of shorter height.

**Kabuli Chickpeas** have larger seeds with paper thin seed coats that range in colour from white to pale cream to tan. Kabuli Chickpeas is mainly cultivated in Southern Europe, Northern Africa, Afghanistan, Pakistan and Chile, also introduced during the 18th century to India.
In comparison with Kabuli Chickpeas, Desi Chickpeas have markedly higher fibre content and hence a very low glycaemic index which makes them suitable for consumption to people with blood sugar problems.

Andhra Pradesh is categorized among the states which has shown high growth rate of Chickpea production in India. Since 1971 the state experienced study growth rate in terms of production, area and yield. Chickpea is emerging as a cash crop in black cotton soils of Andhra Pradesh replacing different crops like cotton, paddy, sugarcane, groundnut and tobacco. Having realised that crops like cotton are prone to pests and diseases and prices being subjected to high fluctuations, Chickpea a low risk crop, is found to be a suitable alternate to varied dry land agro climatic conditions of the state. Low pest and disease attack compared to other crops, storability and less price fluctuations triggered the adoption of Chickpea by farmers.
Kurnool district represents an important region in Rayalseema belt of Andhra Pradesh having average rainfall of less than 700mm per annum which encouraged a shift towards production of Chickpea as a Rabi crop in the study area. Other crops include sunflower and chillies.

The crop also provides an important source of food and nutritional security for the rural poor, especially those who cannot produce or cannot afford costly livestock products as source of essential proteins. The consumption of Chickpea is also increasing among the urban

population mainly because of the growing recognition of its health benefits and affordable source of proteins.

## 2. Objective of the study:

The objective of this study is to identify the key factors that enabled Chickpea revolution in Kurnool district of Andhra Pradesh with a special focus on post-harvest issues like post-harvest losses, and storage, packaging and marketing channels. This study employs a value chain approach to examine the factors that affect Chickpea production, value addition at each stage, marketing and utilization of Chickpea. Also an attempt was made to study the "Inclusiveness" of value chain in benefitting small and marginal farmers. In Kurnool district of Andhra Pradesh, Chickpea is a major crop. Therefore this district was purposively selected. Chickpea is mainly grown as a *Rabi* crop (post-rainy season) in Andhra Pradesh. It is usually cultivated without irrigation as it is rain-fed. It requires minimal inputs and the maturity period of the crop is 90 to 100 days. The major crops grown in Rabi season are chickpea, sunflower and jowar whereas in *Kharif* paddy, maize and cotton are major crops.

The study is undertaken with following objectives:

- To study the inclusiveness of Chickpea value chain in benefitting small and marginal farmers.
- Better understanding of the key factors and supporting policies that facilitated Chickpea revolution in Andhra Pradesh with a special focus on post-harvest issues.
- Identifying the movement of Chickpea along the value chain, based on the number of value added products along the value chain.
- To study the value addition and workout profit margins along the value chain.
- To examine and assess constraints in the present value chain.

A survey was conducted along the value chain that links producers in the primary markets with domestic consumers.

## 3. Methodology

This section describes the selection of data for the study. Primary data collection on production and marketing was the most crucial aspect which was carried out by visiting farmers and other market functionaries like traders, processors, commission agents, wholesalers and retailers in the value chain on the basis of personal interaction. Similarly secondary data pertaining to the area production, productivity and other parameters has been collected from Joint Director of Agriculture, Assistant Director of marketing, Agriculture Officers etc. The list of Mandals was obtained from the Joint director of agriculture, Kurnool. Based on the list, out of 11 Divisions, Koilkuntla division was selected on the basis of highest Chickpea acreage of 58,127 acres. This division includes 6 Mandal, namely,

Koilkuntla (13245), Dornipadu (5132), Uyyalawada (15105), Sanjamala (13989), Kolimigundla (6237), and Owk (4419). A similar exercise was carried out in selecting the Mandal and villages. Out of these 6 Mandals, 3 were chosen for the study: Koilkuntla, Uyyalawada and Sanjamala. Then, village list was obtained from the Agriculture offices of the respective Mandal. From Koilkuntla Mandal, Gulladurthy village was selected with Chickpea acreage of 3450 acres and Amadala village with an area of 410 acres. Similarly, Harivaram village was selected from Uyyalawada Mandal with an area of 1780 acres and, Ailwakonda village with an area of 3950 acres from Sanjamala Mandal.

Using secondary data, an analysis of the global trends in Chickpea area, production and yield was done.

## 4. Chickpea Area, Production and Yield trends

### 4.1 Area

The table below shows that globally, Chickpea is grown on 12 million ha. Most of the Chickpea area is concentrated in Asia, which accounts for 89% of the global Chickpea area, i.e. 11 million ha. India being the largest producer of Chickpea in the world, accounts for two-thirds of the global and 77% of Asia's Chickpea area (graph 1). A rise in the area has been observed from 6.5 million hectares in 1999-2001 to 7.1 million hectares in 2005-07 and further increase to 8.6 million hectares in 2010-12.

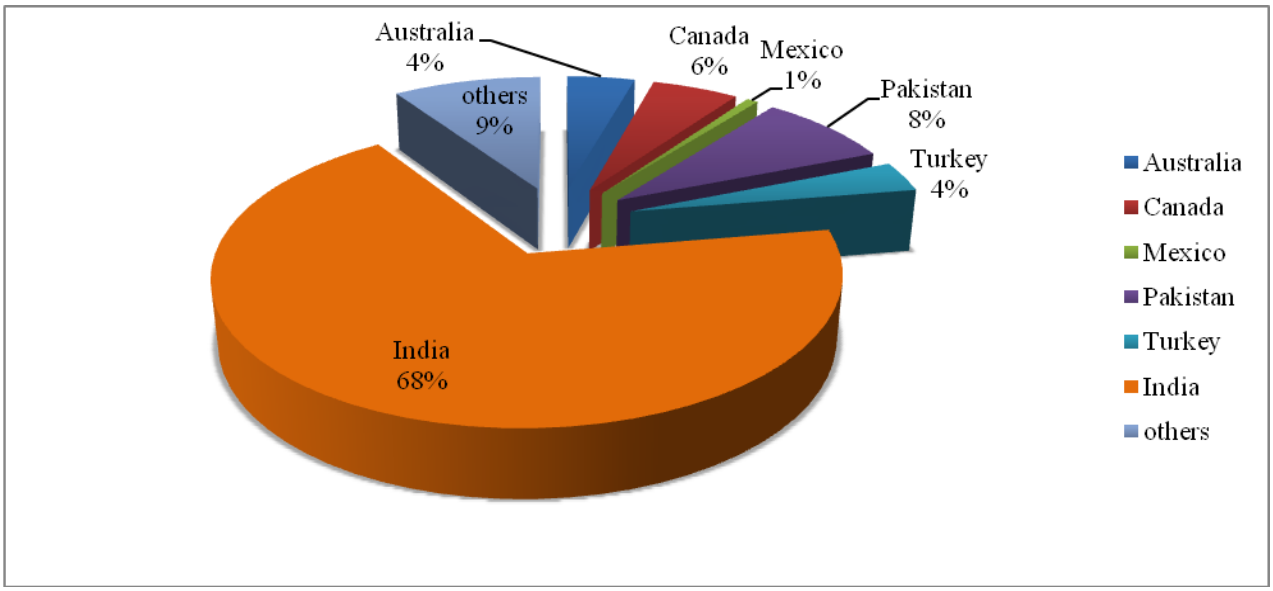
Pakistan and Iran are other important Chickpea growing countries in the region. In 2010-12, these two countries accounted for about 10% and 6% of Asia's Chickpea area respectively (graph 1).

**Table 1: Trends in Chickpea area, yield and production**

| country/ region | Area ('000 ha) | | | Yield (kg/Ha) | | | Production ('000 tonnes) | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1999-2001 | 2005-07 | 2010-12 | 1999-2001 | 2005-07 | 2010-12 | 1999-2001 | 2005-07 | 2010-12 |
| **Africa** | 515.5 | 510.5 | 564.7 | 638.4 | 770.9 | 1109.6 | 328.8 | 392.7 | 628.6 |
| **Asia** | 9266.9 | 9585.2 | 11096 | 737.2 | 815.6 | 875.1 | 6867.7 | 7824 | 9706.9 |
| **India** | 6600.2 | 7034.9 | 8560 | 793 | 822.7 | 911.8 | 5258 | 5792.8 | 7800 |
| **Pakistan** | 984.5 | 1058.2 | 1058.5 | 555.9 | 685.4 | 424.2 | 553.1 | 728.5 | 449.5 |
| **Turkey** | 635.3 | 528.6 | 436.2 | 862.3 | 1043.7 | 1188.8 | 547.6 | 552.3 | 517.7 |
| **Iran** | 657.2 | 578.6 | 545.2 | 339.8 | 528.1 | 533.4 | 225.2 | 306.2 | 291.1 |
| **Australia** | 225 | 218.4 | 536.4 | 998.6 | 1046.6 | 1155.5 | 216.6 | 223 | 596.2 |
| **Canada** | 294 | 124.7 | 68.4 | 1255.1 | 1333 | 1831.3 | 343.2 | 163.9 | 125.4 |
| **Mexico** | 155.5 | 100.2 | 90.2 | 1617 | 1489.6 | 1672.1 | 252.5 | 148.6 | 158.6 |
| **World** | 10602.8 | 10662 | 12534.7 | 766 | 832.1 | 916.6 | 8135.1 | 8881.1 | 11479.9 |

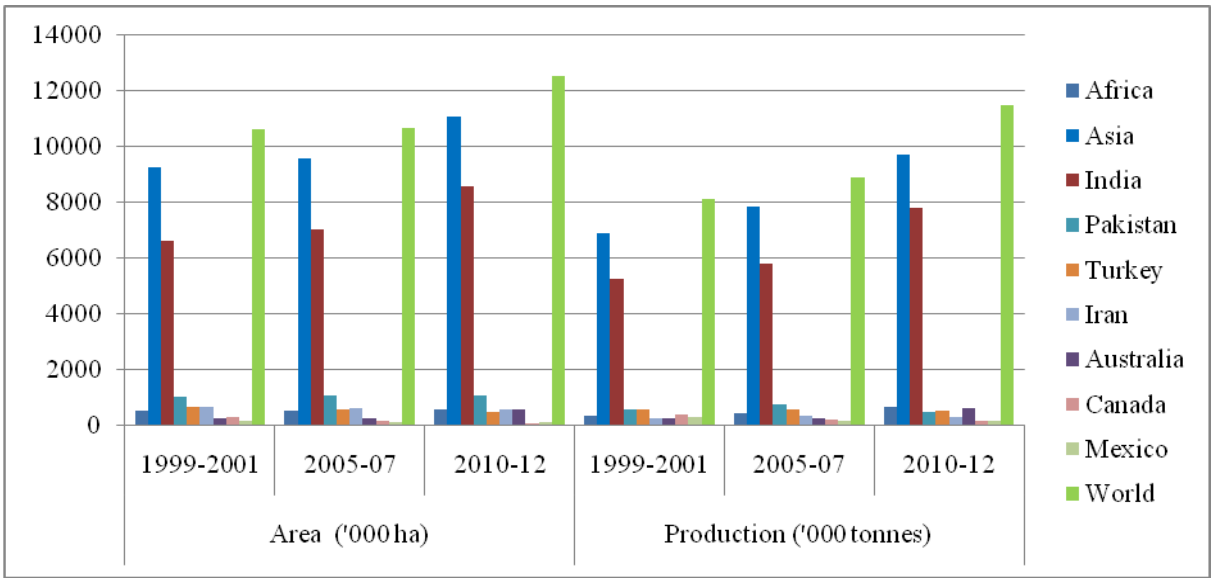
Source: FAO stat

**Chart 1: Distribution of chickpea area, 2010-12**




Source: FAO stat

**Chart 2: Global area and production of chickpea**




Source: FAO stat

In India, Chickpea is largely grown under rain-fed conditions; only one-third of the area is irrigated (GOI).In the early 1970s, Chickpea cultivation was concentrated in the northern states of Punjab, Haryana and Uttar Pradesh; western states of Rajasthan and Madhya Pradesh. However, during the last few decades, with increasing availability of short and medium duration varieties, Chickpea cultivation has expanded considerably in the hot, dry climatic regions such as Madhya Pradesh, Maharashtra and Andhra Pradesh. Although Chickpea was more adapted to temperate climates, technological advancements in Chickpea breeding have made it possible to cultivate it in semi-arid tropics. The semi-arid tropics now

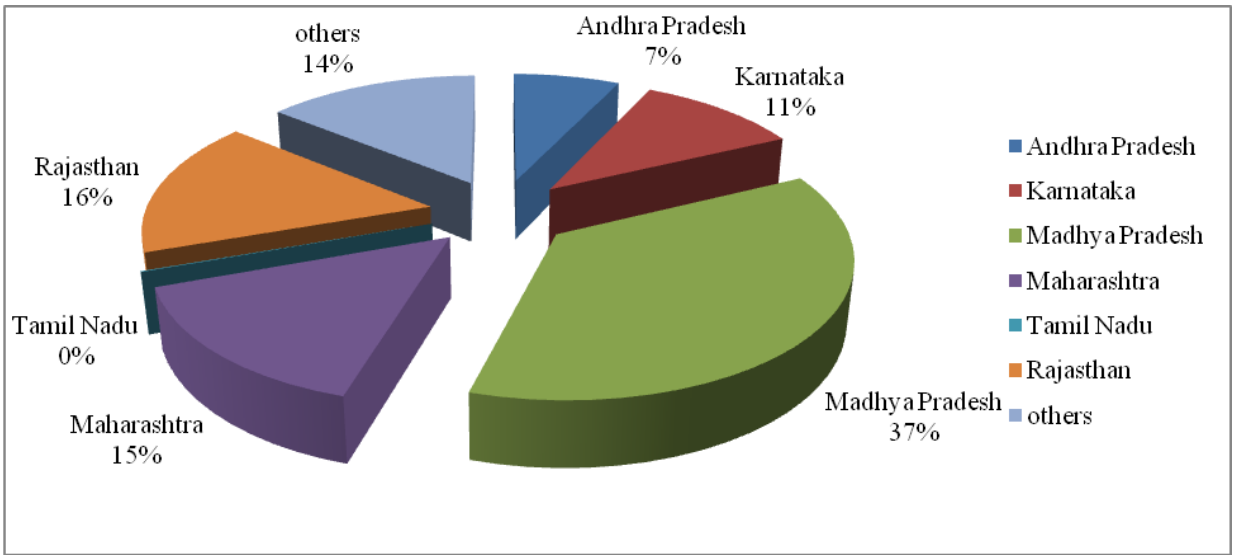
account for over 61% of India's total Chickpea area as against 38% in 1981-83 (ICRISAT database).

Chickpea is grown mainly in six states namely Madhya Pradesh, Rajasthan, Maharashtra, Uttar Pradesh, Karnataka and Andhra Pradesh, and together they account for more than 80% of the Chickpea area. Madhya Pradesh and Rajasthan account for more than half of the cultivated area. Madhya Pradesh and Rajasthan states share about 37 and 16 percent of the total Chickpea area respectively in the country. Andhra Pradesh accounts for around 7% of the total area.

**Table 2: Trends in Chickpea area, yield and production across states in India**

| States | Area ('000 ha) | | | Yield (Kg/Ha) | | | Production ('000 tonnes) | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1991-93 | 2005-07 | 2009-11 | 1991-93 | 2005-07 | 2009-11 | 1991-93 | 2005-07 | 2009-11 |
| Madhya Pradesh | 2294.7 | 2487.4 | 3080.4 | 795 | 872 | 1005 | 1823.1 | 2173.1 | 3093.7 |
| Rajasthan | 1233.1 | 1108 | 1367.2 | 606 | 591 | 747 | 739.9 | 641.9 | 1065.5 |
| Maharashtra | 568.7 | 1227 | 1260 | 570 | 741 | 847 | 333.6 | 915 | 1076.3 |
| Karnataka | 235.6 | 558 | 911.3 | 399 | 543 | 611 | 95.5 | 301.3 | 557.7 |
| Andhra Pradesh | 70.9 | 542 | 598.7 | 622 | 1375 | 1161 | 45.2 | 730.7 | 695.3 |
| India | 6130 | 7320 | 8415.7 | 736 | 805 | 902 | 4506.667 | 5800 | 7585.7 |

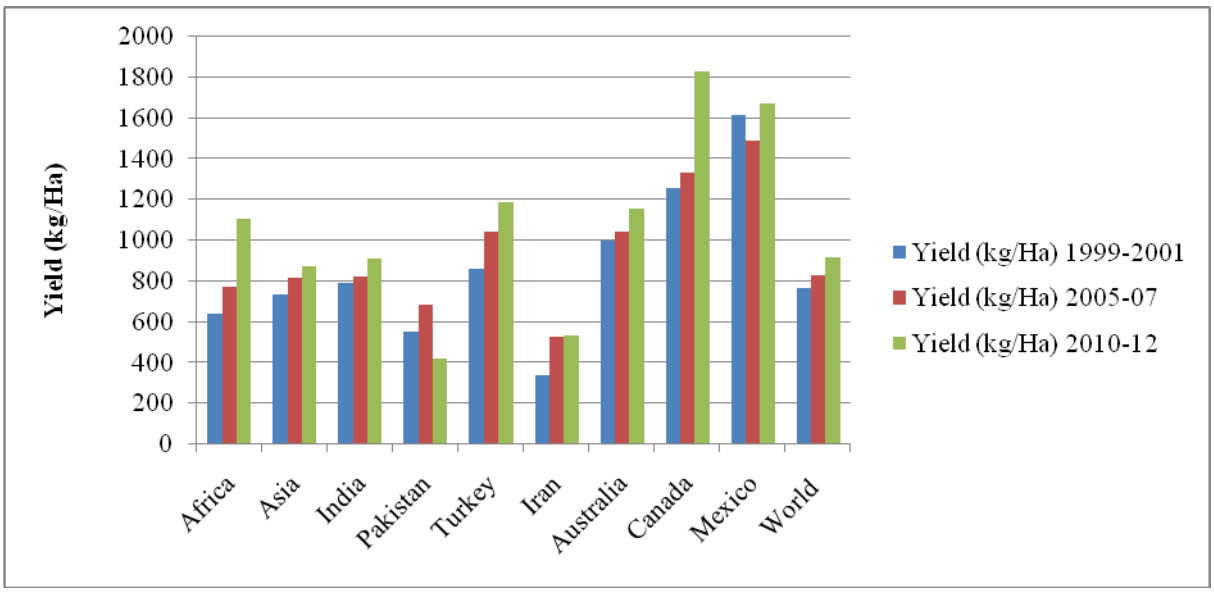
**Chart 3: Distribution of chickpea area in India, 2009-11**



## 4.2 Yield

Chickpea has not demonstrated any significant productivity gains. Between 1999-2001 and 2005-07, global Chickpea yield increased from766 kg/ha to 832 kg/ha and further to 917 kg/ha in 2010-12. In India, Chickpea yield grew from 793 kg/ha in 1999-2001 to 822.7 kg/ha in 2005-07 to 911.8 kg/ha in 2010-12. Despite slower growth in yield at an all India level, adoption of improved varieties and crop production practices contributed to the remarkable yield at a disaggregated level we find that Chickpea yield in Andhra Pradesh increased from 622 kg/ha in 1991-93 to 1375 kg/ha in 2005-07 and declined slightly to 1161 kg/ha in 2010-12 compared to other important Chickpea growing states Madhya Pradesh, Maharashtra and Rajasthan.

**Chart 4: Chickpea yield across major chickpea producing countries**

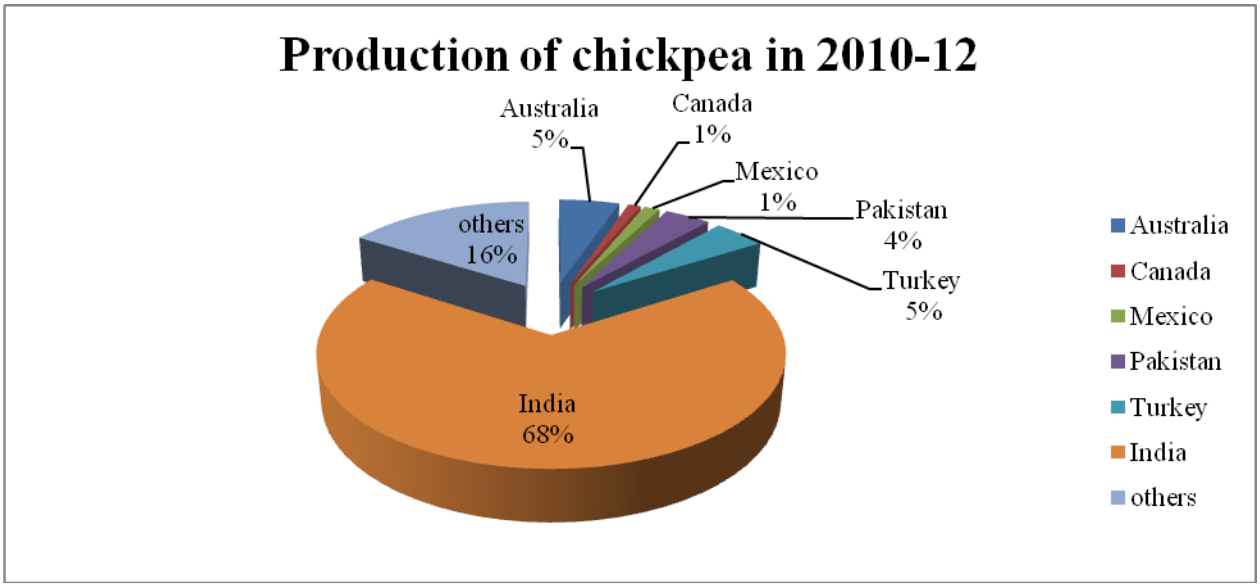



Source: FAO stat

## 4.3 Production

Global Chickpea production increased from 7.2 million tonnes in 1991-93 to 8.8 million tonnes in 2005-07 and further to 11.5 million tonnes in 2010-12. Both area expansion and productivity improvements contributed to increased production. Chickpea is the major source of pulses in India and constitute roughly about 68 per cent of the total pulse production. India is world largest producer of Chickpea.

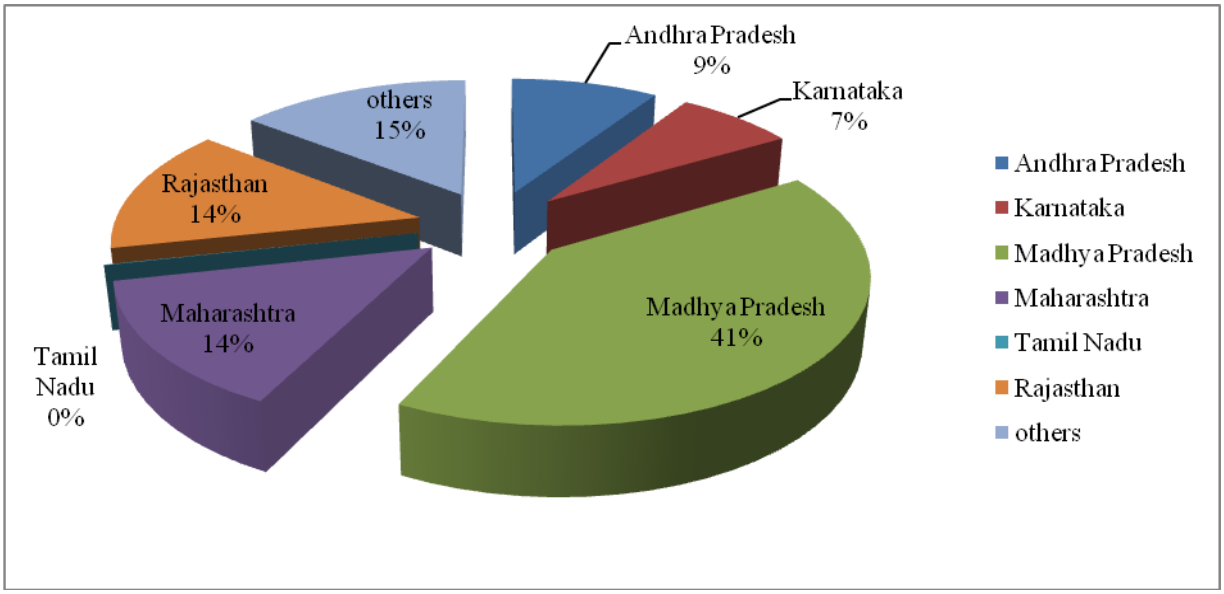
**Chart 5: Global production of chickpea**




**Source: FAO stat**

At an all India level, production increased from 5.2 million tonnes in 1999-2001to 5.8 million tonnes in 2005-07 and further to 7.8 million tonnes 2010-12. Despite inter-year fluctuations in productions, the overall trend is an increasing one.

**Chart 6: Distribution of chickpea production across various states in India**




More than 80 per cent of the production comes from Madhya Pradesh, Rajasthan, Maharashtra, Uttar Pradesh, Karnataka and Andhra Pradesh. The individual share of production of Andhra Pradesh, and Maharashtra are 9 and 14 per cent respectively.

Over the years, Chickpea production in Andhra Pradesh has increased from 45.2 thousand tons in the year 1991-93 to 730 thousand tonnes in 2005-07 which shows the success of Chickpea revolution in Andhra Pradesh which started after 2005. Although there is a slight fall in the production of Chickpea to 695 thousand tonnes in 2010-12 owing to the fluctuation in market prices. Similarly in Maharashtra, production of Chickpea has increased from 336 thousand tons in 1999-2001 to 1076thousand tonnes in 2010-12 (Figure 6). Overall, the shift in production from the northern regions of India to the southern regions is observed.

Chickpea is mainly grown as a commercial crop in Andhra Pradesh. The main Chickpea producing districts in Andhra Pradesh are Kurnool, Prakasham, Ananthpur, Cuddapah, Medak and Guntur. Kurnool district has the largest area under Chickpea cultivation followed by Prakasham, Ananthpur and Cuddapah (JDA, Kurnool). In Andhra Pradesh, 36 % of the area under Chickpea cultivation is in Kurnool district. In Prakasham district the area under Chickpea cultivation has been steadily increasing. Kurnool and Prakasham districts account for more than 50% of the area in Andhra Pradesh.

## 5. Chickpea International Trade:

Both desi and kabuli types of Chickpea are traded in the international market. The kabuli type commands a higher price owing to its larger seed size, and the desi type is smaller in size and is relatively cheaper. The desi type accounts for approximately 80% of the total trade in Chickpea.

**Table 4: Trends in Chickpea trade by region and country**

| country/ region | Imports ('000 tonnes) | | | Exports ('000 tonnes) | | |
|---|---|---|---|---|---|---|
| | 1991-93 | 2005-07 | 2009-11 | 1991-93 | 2005-07 | 2009-11 |
| world | 551 | 835 | 1095 | 521 | 874 | 1181 |
| Australia | 0.1 | 0.16 | 0.14 | 153.7 | 204.8 | 462 |
| Asia | 357.7 | 538.8 | 791.8 | 303.1 | 330 | 301.3 |
| India | 113 | 184 | 179 | 2.6 | 89 | 162.9 |
| Canada | 2.1 | 5.3 | 7 | 1.7 | 75.7 | 73.0 |
| Mexico | 0.09 | 0.024 | 0.17 | 37.3 | 105.1 | 102.5 |

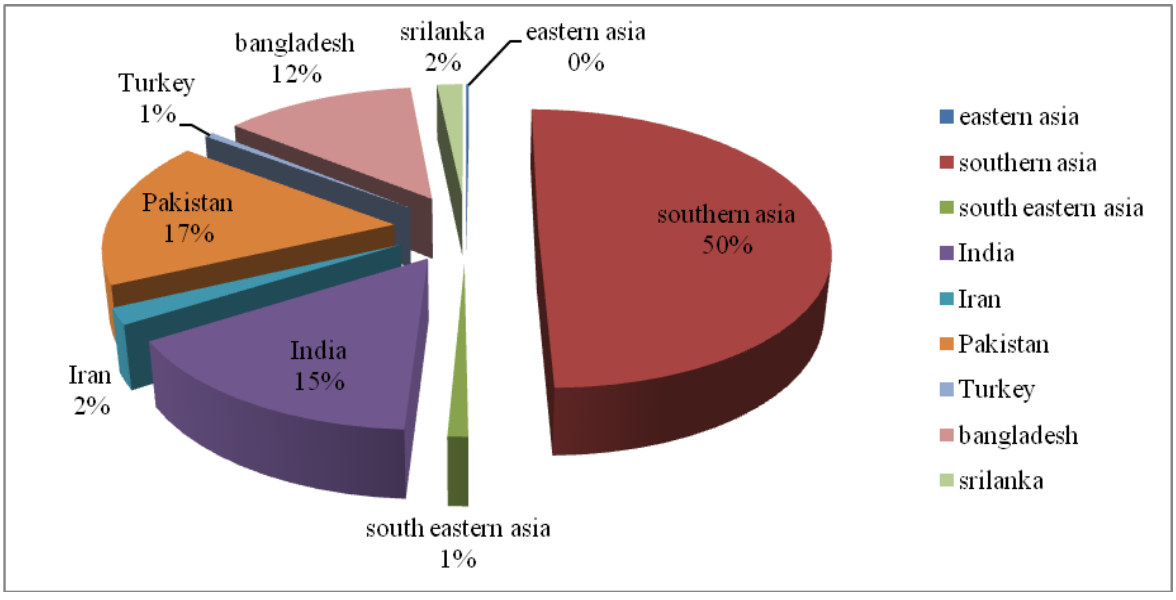
**Source: FAO stat**

## 5.1 Imports

India has had a liberal policy towards pulses imports during the last two decades. Pulses imports were placed under Open General License in 1979, allowing any public or private sector player to import into India without approval or restriction. Import duties on pulses declined steadily during 1990s. With the elimination of import duties since 2000, imports of pulses to India have risen. Import of Chickpea into India is showing a rapid increase until 2009 when after that it started to fall. In 2011, India imported 142776 tonnes of Chickpea at a value of Rs 6547800. Major sources of Chickpea imports for India are Australia, Canada and USA.

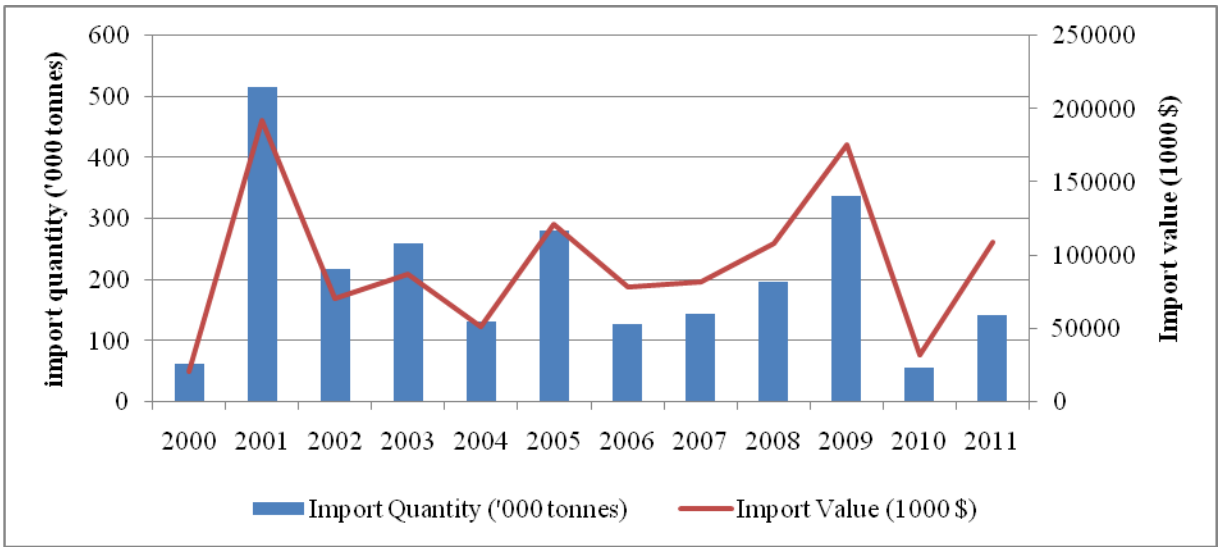
Chickpea imports grew rapidly in developing countries. Asia accounts for a sizeable share of total imports i.e. 44%. Out of which Southern Asia accounts for 32% of world's total imports and 50% of Asia's total imports. There is significant increase in Imports by Bangladesh, India and Pakistan accounting for 12%, 15% and 17% respectively. India over the years continues to be the world's largest importer of Chickpea. Despite being the largest producer, the country has to rely upon imports due to explosive growth in population.

**Chart 7: Major importing regions and countries in Asia, 2009-11**




**Source:** FAO **stat**

**Chart 8: Trend in import of chickpea since 2000 in India**

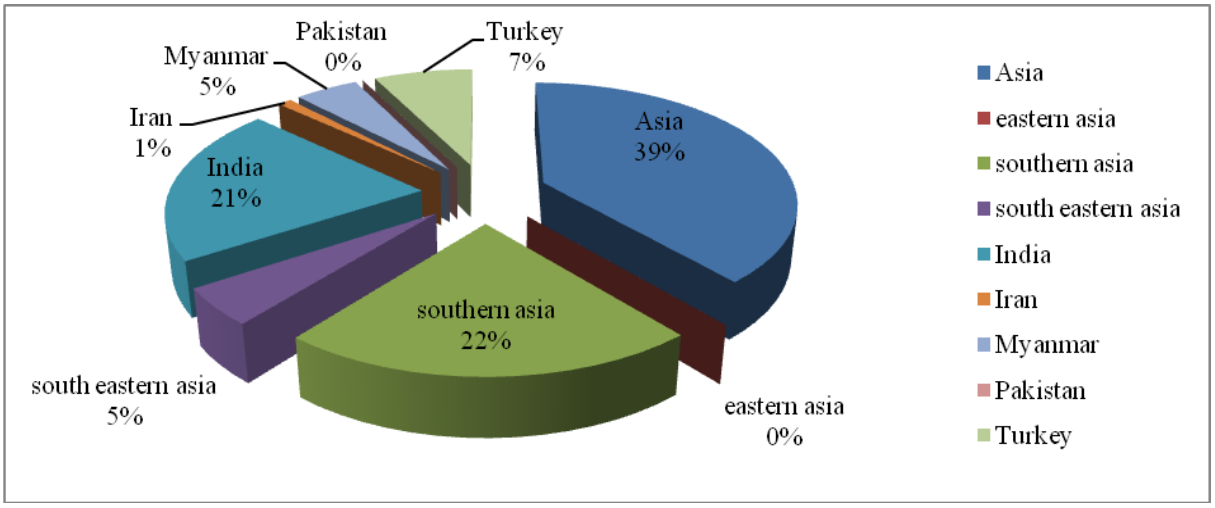



Source: **FAO** stat

## 5.2 Exports

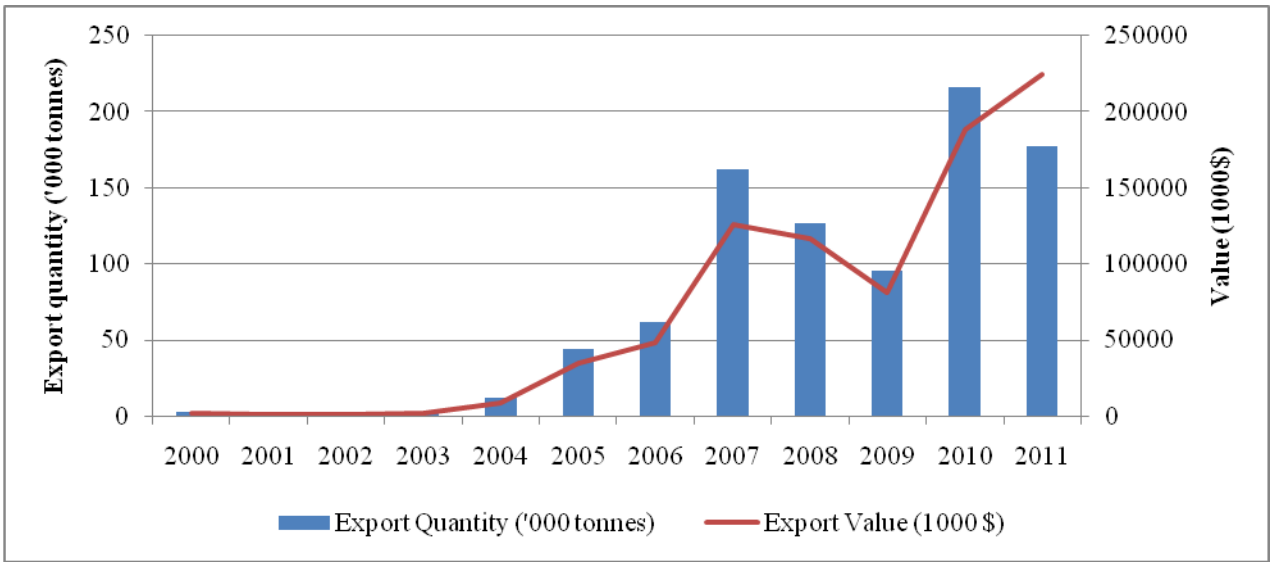
On the export front, India removed packaging restrictions of 5 kg for export of pulses in 2002, thus making exports free without any restrictions. However, in 2006, due to domestic shortages, the government banned exports of pulses, but it does not apply to the export of Kabuli Chana. The ban was extended to March, 2014. Among the main exporters, Australia is the largest exporter of desi type Chickpea. This graph above (graph 5) shows the trends in the export quantity and value of Chickpea in India since 2000.

**Chart 9: Major Exporting countries (percentage share)**




Source: FAO stat

**Chart 10: Trend in export of chickpea since 2000 in India**

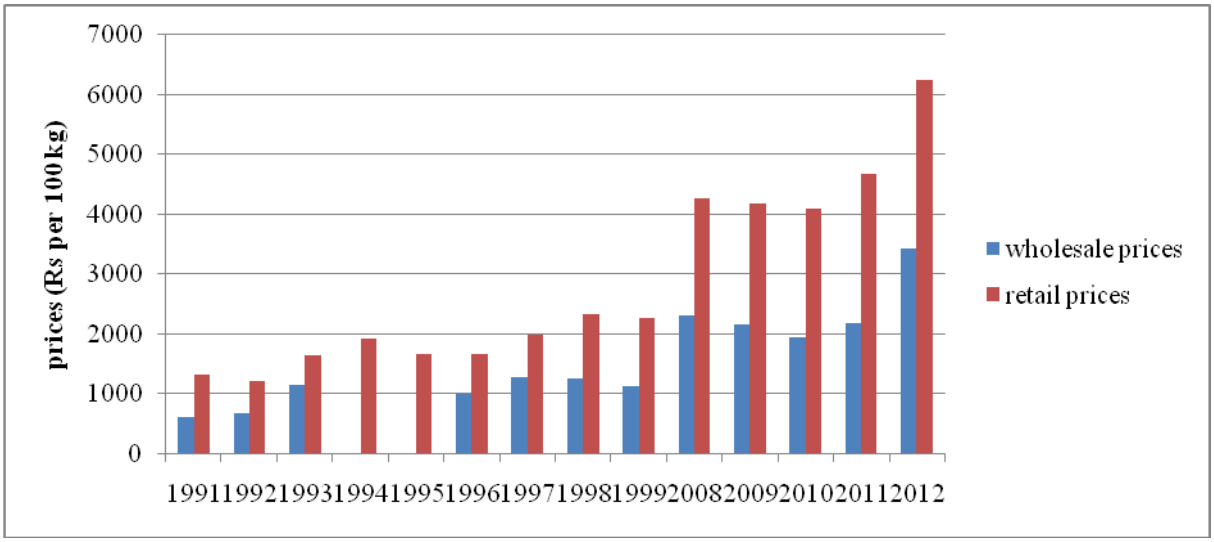



Source: FAO stat

## 6. Trends in prices

The price paid for Chickpea in Indian markets appears to differ depending on Chickpea variety and the type of market. India is the largest producer and consumer of Chickpea. Its global prices are thus to a large extent influenced by production and price trends in India. Below is a graph showing a comparison of the wholesale prices of whole grain and retail prices of Chickpea split dal in Maharashtra.

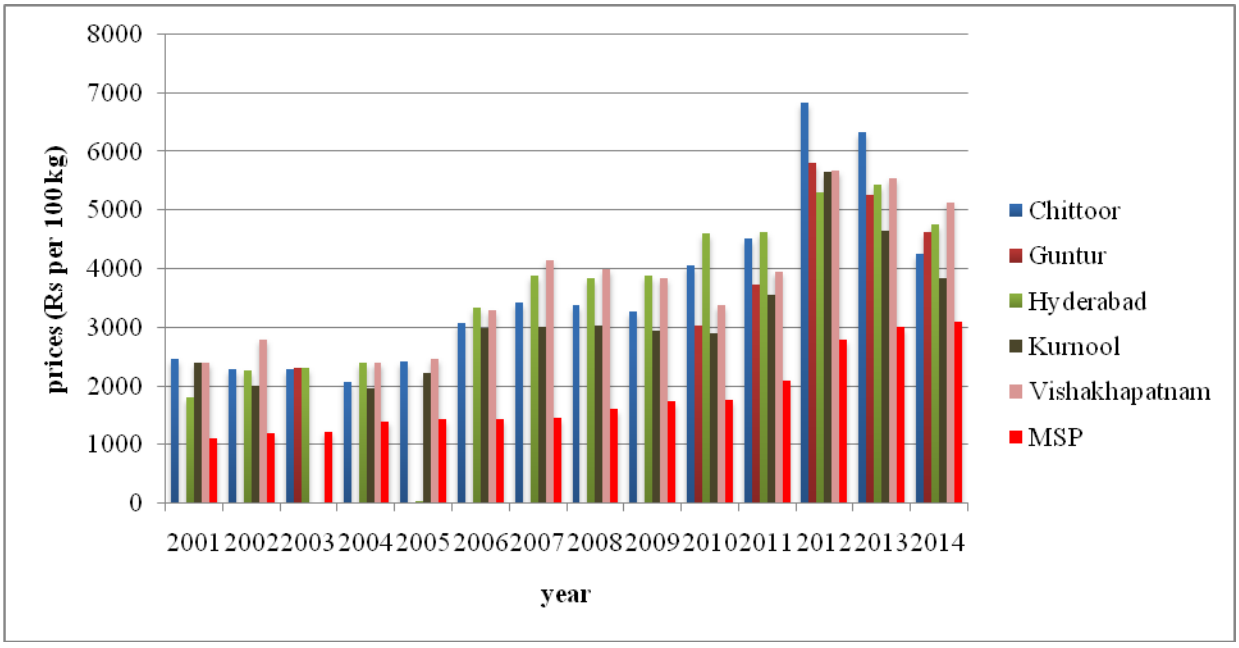
**Chart 11: A comparison of whole chickpea wholesale and split chickpea retail price in Maharashtra**



This graph shows the monthly wholesale and retail prices of Chickpea (whole grain) in Maharashtra (Bombay market). In general, the prices have been considerably fluctuating. The gap between wholesale and retail prices is huge. However, the prices started rising after 2008 and there was a slight fall in 2010 in both wholesale and retail prices. Since then, the trend has been an increasing one.

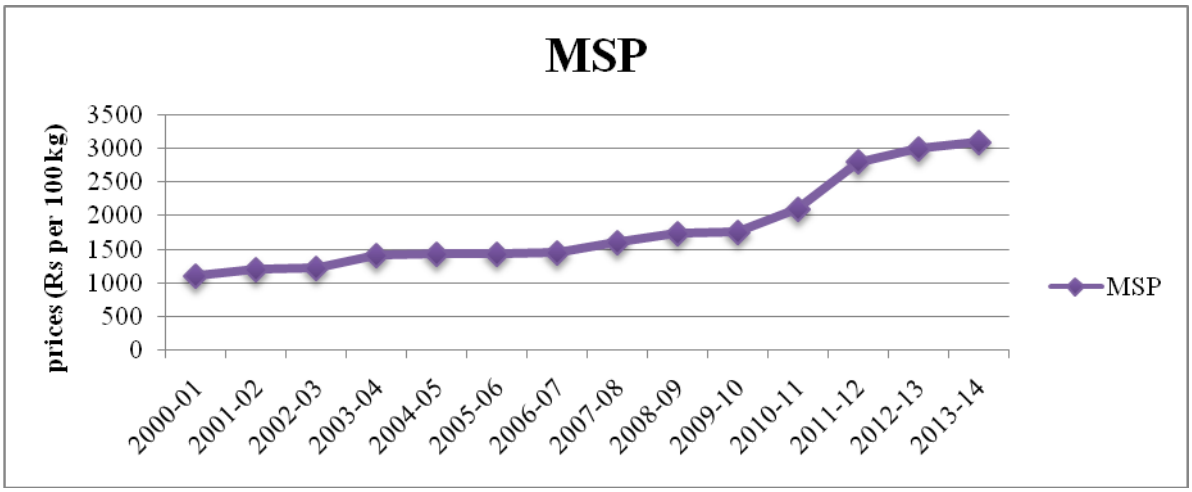
To examine the competitiveness of Chickpea, here a comparison is done between the Chickpea retail prices in Andhra Pradesh and the MSP set by the government. The graph below shows that the retail price of chickpea was highest in 2010 and there is a fall in the retail price of chickpea since then in the past two years. Although the difference between minimum support price and retail price of chickpea is very high, which shows the higher margins of processors, wholesalers and other intermediaries involved the system of value chain of Chickpea.

**Chart 12: Comparison of whole chickpea MSP and market-wise retail prices in Andhra Pradesh**



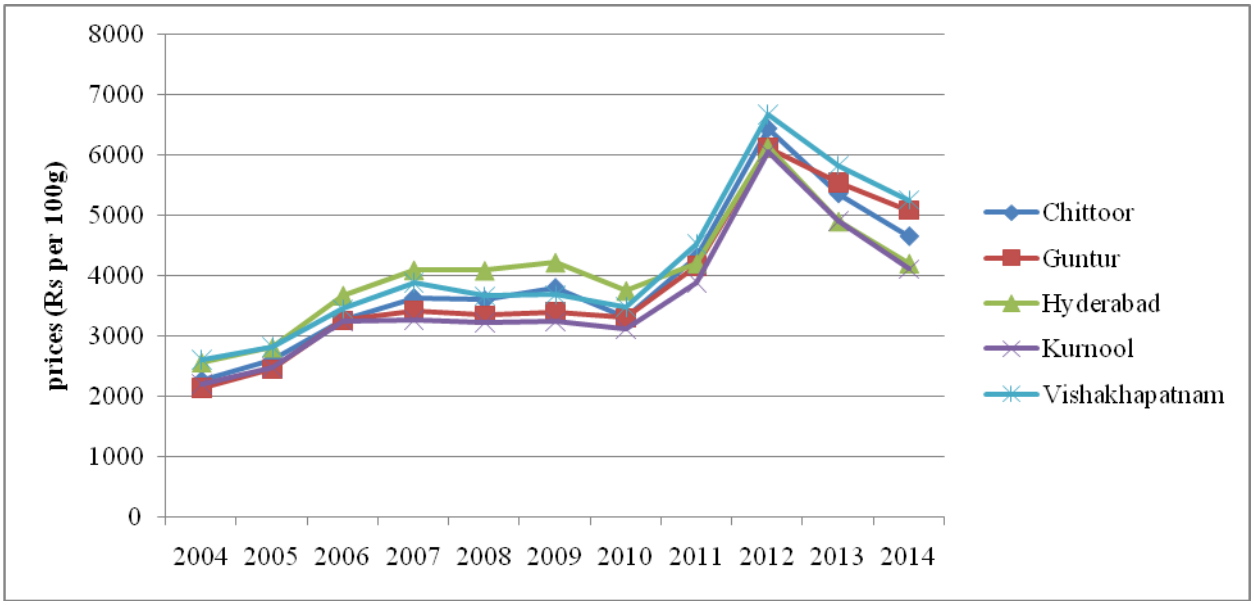

The government of India announces Minimum Support Prices for several crops including pulses as a floor price for procurement by government agencies. In a bid to improve acreage under pulses, the MSP for Chickpea and for other pulses like moong, lentil etc. has been hiked steadily over the years. However the big push came in 2007-08 when the MSP for Chickpea was increased by 11%. The increase in MSP has had a positive effect on the production of Chickpea in the recent years. Since 2010 an increasing trend has been observed in the minimum support price of Chickpea, with a maximum increase in 2011-12, which shows an increase of 33%.The MSP for chickpea in 2013-14 is fixed at Rs 3100.

**Chart 13: Trend in MSP**




The government has been revising the MSP upwards for legumes namely, Chickpea, and pigeon pea year on year. It is to be noted that supply of pulses is deficit in the country and efforts are being made to make India self- reliant.

**Chart 14: Market-wise chickpea (split) retail prices in Andhra Pradesh**




The graph above shows the retail price of split chickpea *dal* in Andhra Pradesh. As compared to whole Chickpea, the retail price of split chickpea *dal* is higher as compared to whole Chickpea. The reason behind higher price of Chickpea *dal* is the value addition which is done by the processors and it includes the processing costs incurred by the processing units and their margins.

## 7. Economics of farming Chickpea

This section evaluates the various aspects related to farming of Chickpea and the economics i.e. cost and returns of its cultivation in the selected area of study.

| ***Costs and returns economics for farmers per acre*** | |
|---|---|
| **COST OF CULTIVATION FOR CHIICKPEA (PER ACRE OF LAND)** | |
| **Particulars** | **Amount (in rupees)** |
| Land preparation (using FYM) | 1500 |
| Seed cost 35 kg @ Rs 50/ kg | 1750 |
| Sowing | 400 |
| Fertiliser cost(DAP) | 2360 |
| Plant protection (3-4 times spraying) | 1785 |
| Harvesting | 1000 |
| Threshing | 800 |
| **Total cost of cultivation** | **9595** |
| **Marketing cost** | |
| Bagging Rs 20/50 kg | 40 |
| Transportation | 15 |
| Hamali | 4 |
| Commission | 10 |
| **Total marketing cost** | **64** |
| Total cost | 9659 |
| Yield | 800 kg /acre |
| Market price | Rs 31/ kg |
| Total value of grain (gross returns) | Rs 24800 |
| Total returns (net returns) | Rs 15141 |
| Benefit cost ratio | 2.56 |

Chickpea is able to provide handsome returns to the farmers with a B:C ratio above two. Most of the farmers started growing Chickpea as there were handsome returns from the crop. Chickpea is an easy to grow crop with a low investment as compared to other competing crops such as cotton, Paddy, sunflower, maize and chillies. In the past two-three years, farmers have reported low returns due to fluctuation in market prices and they are either shifting to other crops or are reducing the area on which Chickpea was grown earlier. Majority of the farmers in Koilkuntla division of Kurnool reported that they allocated significant area to cultivation of Chickpea since 2005 and they would like to maintain the area under Chickpea in the days to come if they get a good price for the same. An increase in the market price of Chickpea will help them to retain the area allocated for Chickpea cultivation.

## 8. Farm level storage

The storage of Chickpea at farm level is minimal and for an average duration of 15 to 20 days when the crop is let to dry so that the moisture content gets balanced and crop gets ready for storing in the warehouses.

Warehousing is an integral part of an efficient marketing system of agricultural produce, which is necessary not only to prevent the loss arising out of unscientific storage and to equip the farmers with a convenient instrument of credit but also to provide a place for storage in the production area at the time of surplus (harvesting) and to the consumption area during the lean period (off season). At present, there are three main agencies viz. Food Corporation of India (FCI), Central Warehousing Corporation (CWC), and State Warehousing Corporation (SWC) in the public sector which are engaged in building large scale storage/warehousing capacity in the country.

There are more than 90 warehouses storing chickpea at Agricultural Marketing Committee, Kurnool District. Most of the storage units are privately owned. The government encourages the use of warehouses by giving a subsidy of 25% on the construction.

The storage of Chickpea in the selected villages starts just after the crop is harvested i.e. from the end of February in Kurnool. For every two- three villages there is a warehouse. There are around seven warehouses in Koilkuntla Mandal and each with more than 5000 tonnes capacity. Capacity utilization of warehouses is 100% when the yield is good. There are no restrictions on the quantity of storage and any farmer can store the produce by paying the storage charges of Rs 5 per quintal per month. On an average, a farmer can store 10 tonnes of the produce. Small and marginal farmers also store the produce in the warehouses on payment of minimal charges.

Negotiable warehouse receipt (NWR) is being issued to the farmers which help them seek loans from banks against NWRs to avoid distress sale of their agricultural produce. The warehouse receipt acts as a negotiable bill for the banks and farmers are eligible for a loan amount of 60 percent of the value of the produce. However, the farmer has to repay the money back to the bank before selling the produces in the market. Also the produce stored in the warehouses is being insured against losses from fire and special perils. Institution such as National Collateral Management Services Limited generates an automated storage receipt stating the produce is insured. The National Collateral Management Services Limited (NCML) is the country's leading organization providing a bouquet of services to manage risks across various stages of commodity and inventory handling under a single umbrella. Its main aim is to create a liquid and safe warehouse receipts market and promote commodity financing.

It was also reported that the farmers were having a practice of storing the produce in a group before going to the warehouses. This practice of localised bulking is called ANAMATHI in their local language. But, now this practise is not prevalent in the study area. Farmers prefer storing the produce on an individual basis.

Majority of the farmers were not aware of cold storage infrastructures in the survey area. Although it was reported by the Assistant Director of Marketing, Kurnool that there are 6 cold storage units in Kurnool district and one is under construction in Nandyal and the number of farmers making use of cold storage units is very less. On an average, 135 farmers were reported to make use of the cold storage units storing approximately 33,500 quintals of chickpea. Whereas in Prakasham, the estimated quantity of produce stored in cold storage was around 9 lakh quintals in 2010-11 (ADM, Kurnool).

## 9. Marketing of Chickpea in Andhra Pradesh

This section focuses on the most important aspects related to marketing of Chickpea by farmers and the chain followed by them before it finally reaches the consumer. The analysis of marketing channels is intended to provide a systematic knowledge of the flow of goods and services from their origin (producer) to their final destination (Scott, 1995). The simplest channel of distribution of Chickpea is one originating at the farmers, going directly to the processors and finally to the consumer. However, the involvement of other key players or market functionaries such as village level traders, commission agents, and wholesalers make the supply chain of Chickpea much more complex. However, the most popular channel of Chickpea that was observed in the area under study shows the presence of traders or brokers at each stage of marketing. When the produce is harvested, farmers contact the village level traders to inquire about the price and sell the produce to the processors/ millers if they are satisfied with the price they are getting. Once the Chickpea is processed and value is added to the product in the form of *dal*, *phutana*, or *besan*, processors again contact the commission agents or what they call canvassing agents to sell the produce to the wholesalers and then to the retailers and finally to its subsequent user, the consumer.

Also, there is another institutional channel called the National Agricultural Cooperative Marketing federation of India limited (NAFED) which acts as a nodal agency for procuring grain at MSP. NAFED has been procuring grains through APMARKFED which is a state level agency. The estimated quantity of procurement of last year amount to 1, 45,000 quintals. (ADM, Agricultural Marketing Committee, Kurnool)

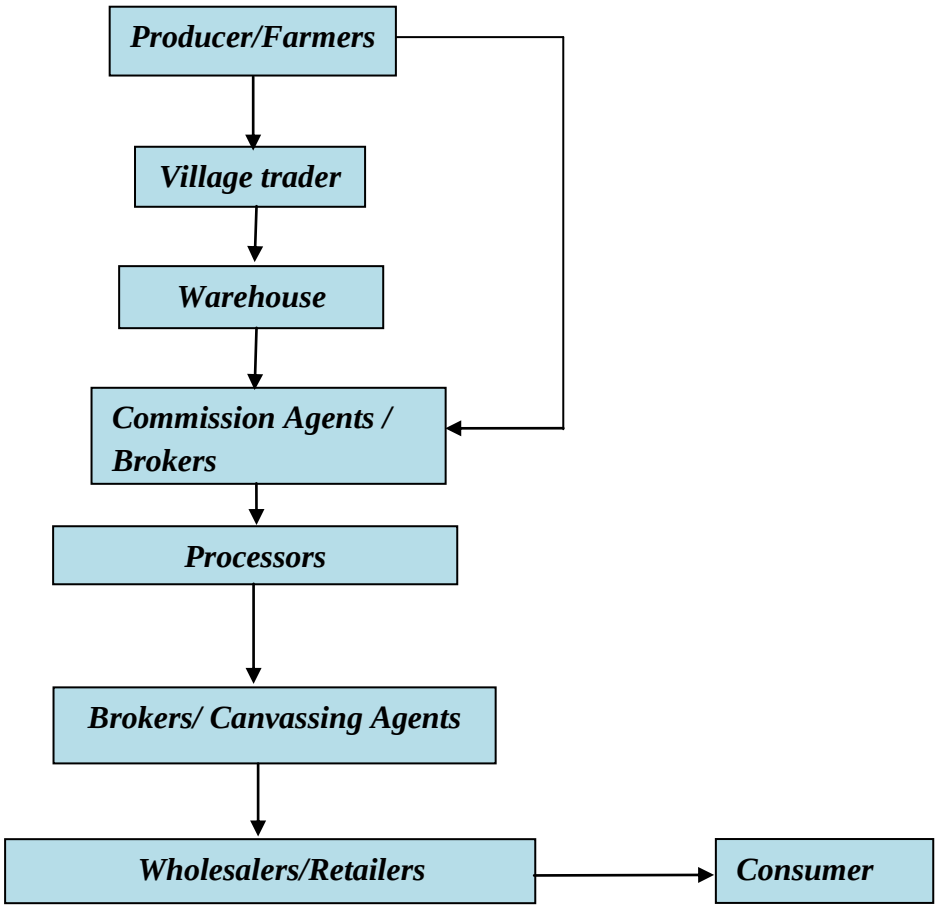
### 9.1 Prices and arrival Chickpea

As the majority of the Chickpea produced is being sold in the market, studying the arrival and prices becomes an important factor to know the effect of seasonal fluctuations of arrival of the crops on the prices in various markets. The peak arrival season for Chickpea is two-three months from the harvesting and mainly starts from February to April. The lean season starts in June and minimum arrivals are seen during July to November.

## 9.2 Marketing channels for Chickpea

The marketing channel followed by Chickpea is longer and complex and necessarily involves processor in the chain. An analysis of marketing margin has been done to assess the margin of each intermediary involved in the channel. At every stage, there is a trader or a commission agent involved.

**Marketing channel for Chickpea in Kurnool district of Andhra Pradesh**




## 9.3 Mapping the value chain

The mapping is done identifying the activities starting from production aspects to the final consumer. The Chickpea value chain highlights how the Chickpea seed produced by famers reaches the consumer. The value chain map revealed that almost all the produced chickpea goes to the processing in various processing units in Rayalaseema region.

### 9.3.1 Primary level

Farmer provides a basis of link for value chain and stands at the primary level. The farmers in Kurnool district of Koilkuntla Mandal, Uyyalawada Mandal and Sanjamala Mandal who produce Chickpea generally obtain seeds and other inputs like fertilisers, pesticides Regional

Agricultural Research Station (RARS), Nandyal, from AO and ADA office and also from private seed dealers or from other farmers. Farmers who have grown chickpea during the preceding year would store the seed material for production in the succeeding year. Chickpea is sown in Rabi season and most of the operations are mechanized. Labour requirement is more during weeding and harvesting periods only, other practises such as cultivation, levelling, ploughing, sowing and spraying is done with the help of machinery. All the harvested produce is transported to processing units/ millers or is stored in warehouses. Kabuli variety of Chickpea is retained for household consumption and no processing is required. The sources of price information for the farmers in case of Chickpea is same as it is for other crops in the region under study, where majority of farmers obtain price information from market participants like village level traders and commission agents through telephonic conversations or through other famers.

### 9.3.2 Secondary level

The commission agents and traders form the secondary level in the value chain. After the harvest, majority of farmers prefer selling the produce to the stake holders like processors via brokers if they are satisfied with prevailing market rate. If they are not satisfied with the prevailing market rate, they prefer storing the produce in the warehouses @ Rs 5 per quintal per month in R.K Reddy warehouse in Koilakuntla, Venkateshwara warehouse, Bhawani warehouse. Small and marginal farmers even prefer storing it in their homes. Commission agents charge Rs 10 as commission from the farmers and sell it to the traders/ brokers. Some of the traders who purchase Chickpea from farmers are Chandrashekhar Reddy, Sri Venkateshwara Traders etc. AMCs in Nandyal are non-functional and no produce is traded through them.

The traders or commission agents in turn sell the produce to the processing units, namely, Sri Siva Sai Food Products in Owk Road, Koilakuntla, Venkata Padmavati *Dal* industries in Tadipatri, Ananthapur district.

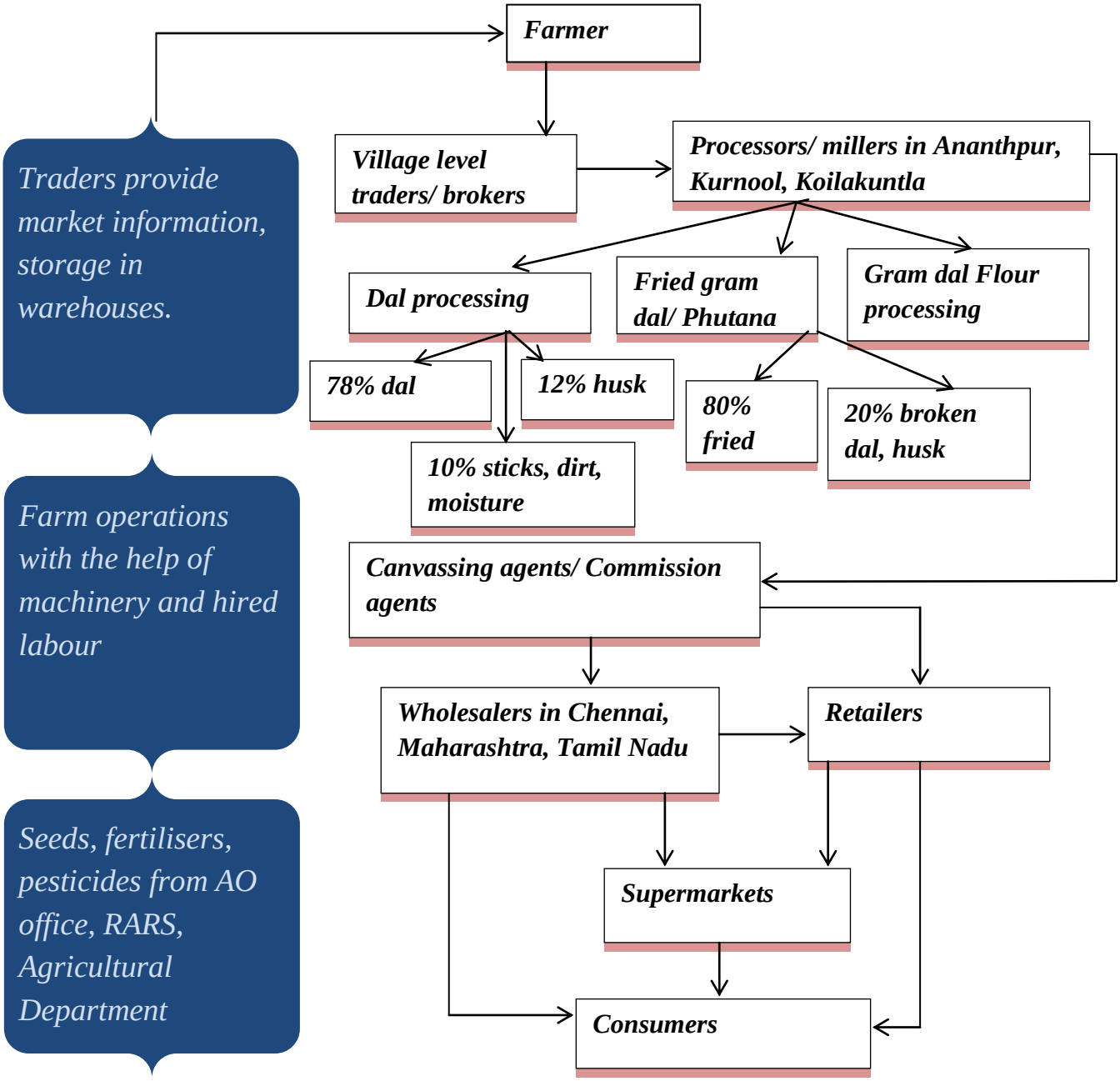
### 9.3.3 Tertiary level

The processors wholesalers and retailers form the tertiary level in the value chain. The processors process the chickpea obtained from the traders, who in turn procure the seeds from farmers. They perform the cleaning process and then the entire processing is done with the help of machinery. The husk that is obtained as by-product is used for the purpose of feeding livestock because of its high protein content.

After the chickpea is processed into split *Dal* and *phutana* or chickpea flour, it is packed into pouches or bags and sold to the wholesalers or retailers via brokers. Mostly the produce is sold outside Andhra Pradesh, as AP has a tax system according to which 4% VAT is to be paid. So, to exempt themselves from tax payment, processed products are sold in Chennai, Tamil Nadu, Maharashtra, and Karnataka.

Value chain analysis helps us to examine the full range of activities required to bring a product or service from its conception to its end use, the firms that perform those activities in a vertically coordinated chain and the final consumers for the product or service.

***Mapping the value Chain of Chickpea***



## 9.4 Value addition along the value chain

After identifying the movement of Chickpea along the value chain, we can analyse the number of value added products along the value chain. Tracing the Chickpea value chain gives three main value added products: chickpea *dal*, fried *dal* (*phutana*) and chickpea d*al* flour which is presented in the following flow chart.

Among the legumes, Chickpea seems to have the maximum diversified usage. Chickpea is used for direct consumption as food. It is further processed into Chickpea *dal, besan*, fried chickpea and various other product forms. Based on the value addition along the value chain, we now analyse the sub-value chains and work out the economics for each value added product.

### 9.4.1 Sub-value chain 1

Farmers --- village level traders/brokers----*dal* millers/*dal* processing units

*Dal* millers procure the produce from farmers via brokers to be further cleaned, stored, and processed. For this, chickpea kernels are sized and graded and after processing, it reaches the consumer through a wholesaler or retailer. Processing of split *dal* involves the following steps explained below.

**Cleaning:**

The first stage of *dal* processing involves cleaning the Chickpea grains and separating the dust particles, dirt, and chaff. This stage of the processing is usually performed by daily wage labourers. After separating the impurities the cleaned Chickpea is dried in the sun.

**Dampening:**

After cleaning the produce, the grain is sprinkled with water in order to increase the size of the seed. They use one litre of water for one quintal of grain. The soaked seed is kept aside for one day a side.

**Pre- conditioning:**

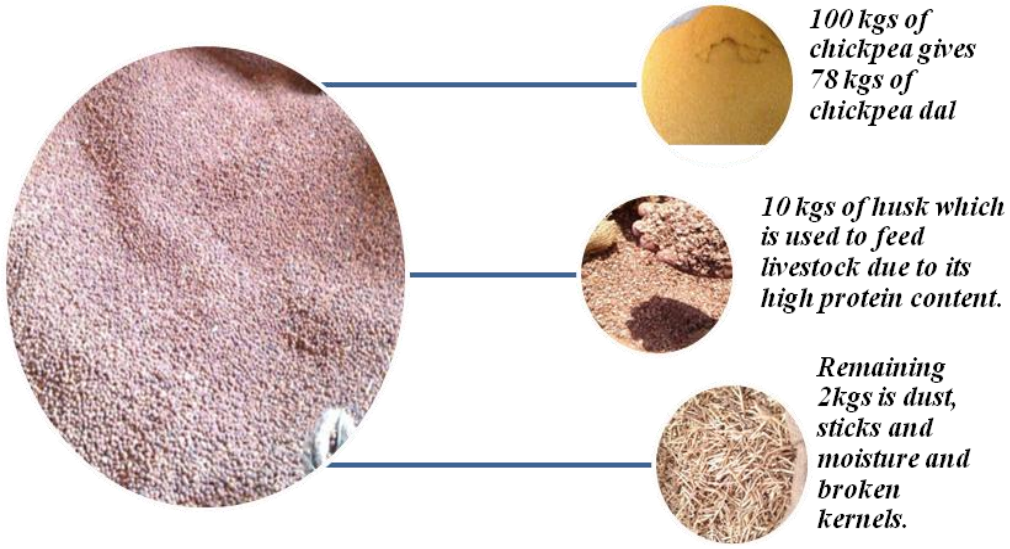
In this process the soaked produce is dried with the use of mechanical dryers. This step is carried out to loosen the seed coat using hullers to facilitate the de-husking process.

**De-husking and Splitting:**

At this stage of the processing chain, the husk is removed from the grain and the grain is split into *dal* using splitter. Both these actions are performed with the help of mechanical operation.

After this, the grains are separated according to their sizes and the polished to prepare the final produce i.e. split *dal*.

***Value addition 1: chickpea Dal processing***




***Economics of processing of* Chickpea *into* Chickpea *Dal***

| ***Cost*** | | | |
|---|---|---|---|
| **Components** | **Price** | | |
| Quantity of raw material | 100 Kgs | | |
| Value of raw material | Rs 3100 | | |
| Cost of processing | Rs 170 | | |
| Total cost | Rs 3270 | | |
| ***Returns*** | | | |
| Components | Product recovery | Price per kg | Returns |
| | | | |
| Main product | 78 | 38 | 2964 |
| Broken chickpea | 12 | 35 | 420 |
| By product(husk) | 8 | 9 | 72 |
| Dirt, sticks, moisture | 2 | 0 | 0 |
| Total returns | 3456 | | |
| Returns per 100 kg | Rs (3456-3270) = 186 | | |

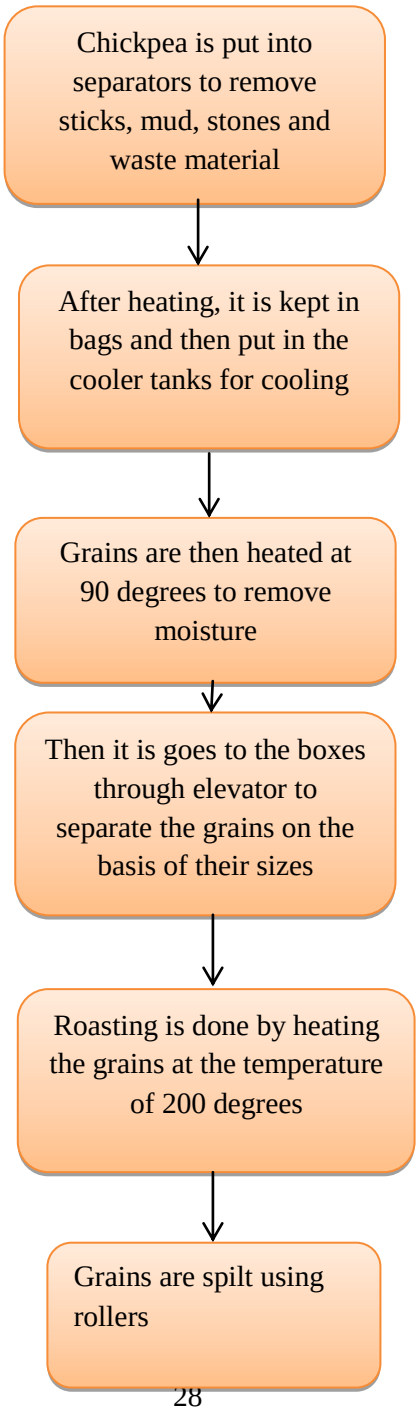
The economics of converting Chickpea into *Dal* has been represented in the table above. It shows that when 1 quintal of Chickpea is processed into *Dal*, it gives 78 kg of chickpea *Dal*, 12 kg broken kernels, 8 kg of husk which is used to feed livestock, remaining are sticks, stones and moisture. The average return as a percentage of sales is around 5.3% for the miller.

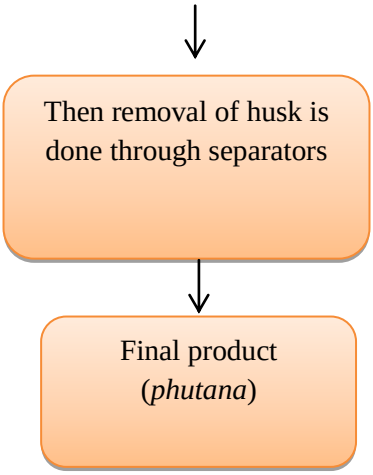
**9.4.2 Sub-value chain 2**

Farmers --- village level traders/brokers----*Phutana* processing units

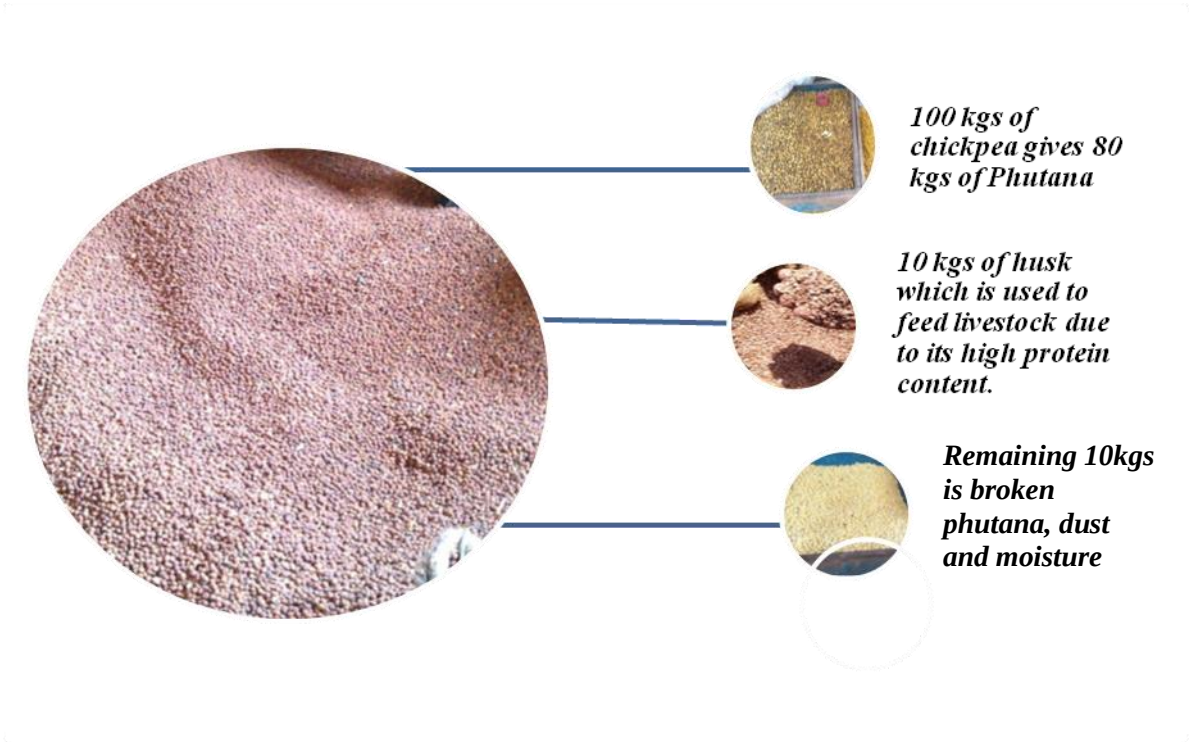
The input for fried chickpea is obtained from farmers via brokers. Fried chickpea or *Phutana* is used in south India for making chutneys and for other food items. The process of producing fried chickpea involves various steps which are performed through an industrial process. The figure below shows the processing of fried chickpea *dal*.

**Flow chart showing the conversion of chickpea into chickpea fried *Dal***






***Value addition 2: Fried chickpea Dal processing***



***Economics of processing of* Chickpea *into fried chickpea Dal***

| ***Cost*** | | | |
|---|---|---|---|
| Components | Price | | |
| Quantity of raw material | 100 Kgs | | |
| Value of raw material | Rs 3100 | | |
| Cost of processing | Rs 200 | | |
| Total cost | Rs 3300 | | |
| ***Returns*** | | | |
| **Components** | **Product recovery** | **Price per kg** | **Returns** |
| | | | |
| Main product | 76 | 45 | 3420 |
| Broken kernels | 5 | 20 | 100 |
| By product(husk) | 12.5 | 14 | 175 |
| Wastage (sameta) | 4.5 | 0 | |
| Moisture loss | 2 | 0 | |
| Total returns | 3890 | | |
| Returns per 100 kg | Rs (3695-3300) = 395 | | |

When 100 kg chickpea is processed into fried chickpea *Dal*, it gives 76% fried chickpea which is sold in the whole form or split form, 12.5% of husk which is used for cattle feed, 4.5% of waste which is called sameta in local language, 5% broken kernels which is sold to local eating outlets for the purpose of making chutney, and 2 % is the moisture loss. The average return as a percentage of sale is around 10.15% for the *phutana* processor.

### 9.4.3 Sub-value chain 3

Farmers --- village level traders/brokers----*Dal* millers/ *Dal* processing units----commission agents---*Dal* flour (*besan*) processing unit

Chickpea has got a wide variety of application. The most common process involves conversion of Chickpea into *Dal*, which is further processed into *besan*. Chickpea *Dal* flour processing units procure processed *Dal* via brokers from *Dal* millers. *Besan* is a very popular consumption product of Chickpea in India used for the preparation of fried items such as bhajji and other namkeens. Fine quality *besan* is also used for preparation of sweets.

There are two grades of *besan* produced:

Grade A: It is a premium quality *besan* and requires powdering of *Dal* in very fine particles. It is used only in making Indian sweets such as Laddu. When 100 kg chickpea *Dal* is processed, it gives 50 kg Grade A *besan* and 50 kg rawa which is further used in the processing of grade B *besan*. It is sold at Rs 4200 per 100 kg and constitutes only 25% the total sales, 75% is Grade B *besan*.

Grade B: To process 100 kg *besan*, it uses 50 kg chickpea *Dal*, 5 kg batana *Dal*, 5 kg moong *Dal*, 5 kg broken rice, 10 kg maize (broken pieces), 5 kg kabuli chana, 10 kg chilka *Dal*, and 10 kg rawa which is obtained from processing of Grade A *besan*. It is sold at Rs 4050 per 100

kg and constitutes 75% of the total sales and has a number of value additions. It is used to make bhajji, other namkeens.

***Economics of processing of* Chickpea*Dal into* Chickpea*Dal flour (Besan) grade B***

| ***Cost*** | | | |
|---|---|---|---|
| Components | Price | | |
| Quantity of raw material | 100 Kgs | | |
| Value of raw material | Rs 3000 | | |
| Cost of processing | Rs 200 | | |
| Total cost | Rs 3200 | | |
| ***Returns*** | | | |
| **Components** | **Product recovery** | **Price per kg** | **Returns** |
| | | | |
| Main product(*besan*) | 90 | 40.5 | 3645 |
| By-product (rawa) | 10 | 0 | |
| Total returns | 3645 | | |
| Returns per 100 kg | Rs (3645-3200) = 445 | | |

The average return as a percentage of sales is around 12 % for the processor. Hence, it is clear from the above mentioned findings that chickpea value chain map revealed that almost all the produced seed goes for processing as split chickpea *Dal*, chickpea flour or *besan*, fried chickpea *Dal* or *phutana*.

## 9.5 Market margins

Marketing costs and margins, primary data on various aspects such as prices received and paid for the produce, different costs incurred while loading & unloading charges (hamali charges), transportation cost, bagging costs, fixed costs and variable costs were calculated. The analytical tools used for calculating price spread, marketing margins, marketing cost are as follows:

### 9.5.1 Total cost of marketing

The total cost incurred on marketing either in cash or in kind by the producer-seller and by the various intermediaries involved in the sale and purchase of commodity till it reaches the ultimate consumer, may be computed as follows:

$C = C_F + C_{mi} + C_{m2} + C_{m3} + \ldots\ldots\ldots + C_{mn}$

C = Total cost of marketing of the commodity,

$C_F$ = Cost paid by the producer from the time the produce leaves the farm till he sells it

$C_{mi}$= Cost incurred by the $i^{th}$ middleman in the process of buying and selling the product

### 9.5.2 Producer's price

This is the net price received by the farmer at the time of first sale. This is equal to the wholesale price at the primary assembly centre, minus the charges borne by the farmer in selling the produce. If $P_n$ is the wholesale price in the primary assembling market and $C_f$ is the marketing cost incurred by the farmer, the producers price ($P_f$ ) is: $P_f = P_n - C_f$

### 9.5.3 Producer's share in consumer's rupee

It is the price received by the producer as a percentage in the consumer's price. If $P_c$ is a consumer's price and $P_F$ is the producer's price then the producer's share in consumer's rupee ($P_s$) may be expressed as follows.

$$Ps = \frac{P_F}{P_c} \text{ X } 100$$

### 9.5.4 Marketing margins of middleman

This is the difference between the total payments (cost + purchase price) and receipts (sale price) of the middleman ($j^{th}$ agency). Three alternative measures may be used.

a)Absolute margin of the ith middleman ($A_{mi}$)

$$(A_{mi}) = P_{Ri} – (P_{Pi} + C_{mi})$$

b) Percentage margin of the ith middleman ($P_{mi}$)

$$(P_{mi}) = \frac{P_{Ri} – (P_{Pi} + C_{mi})}{P_{Ri}} \text{ X } 100$$

Where,

$P_{Ri}$ = Total value of receipts per unit (sale price)

$P_{Pi}$ = Purchase value of goods per unit (purchase price)

$C_{mi}$ = Cost incurred on marketing per unit

The margin calculated include the profit of the middleman and the returns which accrue to him for storage, the interest on capital and overhead, and establishment expenditure.

## 9.6 Price spread and Market margins in value chain channel

Market functionaries or middlemen like traders/ commission agents move the produce from producers to consumers. Processors are involved in value addition. Every function or service rendered by them involves some costs which are presented as marketing costs in the table below.

The traders/processors make some profit after meeting the cost of performing the market functions, presented as respective margins. One predominant channel for each value added product is identified for chickpea for which, the price spread, margins and costs of middlemen per quintal of chickpea were worked out.

**Marketing margin for each value added product**

| S. No | Particulars | Whole Chickpea | chickpea split *Dal* | chickpea fried *Dal* (*Phutana*) | chickpea *Dal* flour (*Besan*) Grade A | chickpea *Dal* flour (*Besan*) Grade B |
|---|---|---|---|---|---|---|
| 1 | **Net price received by producer/Farmer** | 2730 | 2730 | 2730 | 2730 | 2730 |
| 2 | **Expenses incurred by the producer** | 70 | 70 | 70 | 70 | 70 |
| 3 | **Farmers sale price/ Trader purchase price** | 2800 | 2800 | 2800 | 2800 | 2800 |
| 4 | **Marketing costs incurred by trader** | 20 | 40 | 40 | 150 | 150 |
| 5 | **Traders margin** | 60 | 70 | 70 | 50 | 50 |
| 6 | **Trader sale price/ processor purchase price** | 2880 | 2910 | 2910 | 3600 | 3600 |
| 7 | **Marketing costs incurred by processor** | 90 | 170 | 200 | 200 | 200 |
| 8 | **Processors margin** | 200 | 520 | 990 | 400 | 250 |
| 9 | **Processors selling price/ Wholesalers purchase price** | 3170 | 3600 | 4100 | 4200 | 4050 |
| 10 | **Marketing cost incurred by wholesaler** | 30 | 60 | 50 | 40 | 40 |
| 11 | **Wholesalers margin** | 200 | 280 | 650 | 560 | 410 |
| 12 | **Wholesalers selling price/ Retailers purchase price** | 3400 | 4000 | 4800 | 4800 | 4500 |
| 13 | **Retailers marketing cost** | 30 | 40 | 45 | 60 | 60 |
| 14 | **Retailers marketing margin** | 570 | 760 | 655 | 1140 | 1440 |
| 15 | **Retailers selling price/ consumers purchase price** | 4000 | 4800 | 5500 | 6000 | 6000 |
| 16 | **Producer's share in consumer rupee** | 70 | 58 | 50 | 51.6 | 51.6 |

Thus the price spread calculated reveals that whole chickpea has the highest share producer's share in consumer's rupee i.e. 70% followed by Chickpea split *Dal* with 58% followed by chickpea *Dal* flour and chickpea fried *Dal*. As the amount of value addition increases, the share of producer (farmer) in consumer rupee diminishes because of higher marketing costs and margins taken away by traders, processors, wholesalers and retailers. The margins received by traders and processors have been presented in the table above. This situation warrants for proper marketing arrangements such as contract farming where there is predetermined price which will enhance the producer's share in consumer rupee. The sale price of one quintal of Chickpea split *Dal*, fried chickpea *Dal* and chickpea *Dal* flour is worked out to be Rs 4800, Rs 5500 and Rs 6000 respectively, showing the potential of diversity of uses and the amount of value addition done to Chickpea. The margins taken away be traders, processors, wholesalers and retailers amount to 40 to 50 per cent.

Setting up a separate commodity board for the research on value added products of Chickpea and to facilitate the contract farming with legal status to help the industry encourage farming system approach, is a possible intervention to be taken up. Providing increased minimum support price for Chickpea is also needed to encourage farmers to retain the increase in area under Chickpea cultivation. This will also help in improving the returns of the farmers.

**Marketing efficiency (Acharya Approach)**

According to Acharya, an ideal measure of marketing efficiency, particularly for comparing the efficiency of alternate markets/channels is

$$MME = FP \div (MC + MM)$$

Where,

MME = Modified measure of marketing efficiency
FP = Price received by the farmer
MC, MM = Marketing costs and Marketing margins

The Efficiency in marketing is the most used measure of market performance. Improved marketing efficiency is a common goal of farmers, processors and consumers in the society. It is a commonplace notation that higher efficiency means better performance whereas declining efficiency denotes poor performance (Kohls and Uhl 1985).The marketing efficiency was computed using Acharya's method and the results are presented below:

**Indices of marketing efficiency**

| **Particulars** | **chickpea split *Dal*** | **chickpea fried *Dal* (*Phutana*)** | **chickpea *Dal* flour (*Besan*) Grade A** | **chickpea *Dal* flour (*Besan*) Grade B** |
|---|---|---|---|---|
| Price received by the farmer (FP) | 2800 | 2800 | 2800 | 2800 |
| Marketing costs(MC)+ marketing margins(MM) | 1940 | 2700 | 2400 | 2600 |
| MME | 1.44 | 1.04 | 1.17 | 1.08 |

It is observed that market efficiency is highest in case of chickpea dal which is 1.44. It is greater than 1 for all the value added products.

## 10. Post-harvest losses

This section is a review of literature on Post-harvest losses along with a few insights from the field visit.

**Post-harvest Food Loss (PHL)**is defined as measurable qualitative and quantitative food loss along the supply chain, starting at the time of harvest till its consumption or other end uses (De Lucia and Assennato, 1994; Hodges, Buzby and Bennett, 2011). Food losses can be quantitative as measured by decreased weight or volume, or can be qualitative, such as reduced nutrient value and unwanted changes to taste, colour, texture, or cosmetic features of food (Buzby and Hyman, 2012).

Agricultural commodities produced on the field have to undergo a series of operations such as harvesting, threshing, winnowing, bagging, transportation, storage, processing and exchange before they reach the consumer and there are appreciable losses in crop output at all these stages. Multiple handling by various players in the fragmented supply chain and the lack of warehouse and cold storage facilities also result in post-harvest losses. McKinsey's Food and Agriculture Integrated Development Action (FAIDA) Report on Modernization of India Food Chain (1997) reported that inefficiency in the marketing system results in wastage and value loss in excess of US$ 10 billion annually. Around 20% of the value of food produced each year gets lost due to inadequate storage and processing capabilities. The ministry of Agriculture conducted a study on state of Indian farmers in 2004 and estimated that 7% of food grains are lost due to inadequate handling facilities. A study conducted recently by ICAR on status of post-harvest losses in 2010 indicates that total loss for pulses at various stages of marketing ranges from 4.3-6.1%.

At every stage of Chickpea production, some losses take place. The extent of losses depends on a number of factors. The first stage of the post-harvest operation of Chickpea is harvesting which is done manually, simply by using implements like sickle when the pods are ripe. After cutting the crops they are dried before undergoing the operation of threshing. Threshing is the operation of separating the grains from the plants. Threshing operation is carried out with the help of a machine. After threshing, the moisture content of the grains remains generally higher than the general level that is required for storage of grains. That is why the grains are dried in the sun until it reaches the safe moisture level.

Then the produce is made ready for storage. Pulses are more difficult to store as compared to cereals and suffer much greater damage from insects and micro-organisms. Most of the produce is stored in warehouses by stacking the bags. Periodical spraying of insecticides is done along with fumigation. It is a treatment that rids the stored grains of insects by means of a gas called fumigant. The most important insect damaging pulses in field and storage is

referred to as bruchids or pulse beetles. The second important pest in pulse storage is rodents (rats). It causes serious damage not only to the stored products but also to packaging and the storage buildings.

Losses in the entire chain of post-harvest chain of pulses could either be in the loss of weight, quality or the economics loss. (IIPR, Kanpur). Loss in the weight of grain does not necessarily mean a loss of the product. Loss of weight results in reduction of physical substance of the product. For instance, decrease of the moisture content brings about a lowering of weight, but this is not a food loss. On the contrary, an increase in the weight of grain due to absorption of moisture can cause severe damage. This depends on the physical condition of the grain during a give stage of post-harvest system.

Similarly, losses can be categorised as economic loss which results not only due to deterioration in quality or quantity of the grain but is also influenced by some factors within the post-harvest system such as during harvesting, threshing and other operations. Also, if the transport system is inadequate, farmer finds it difficult to sell the produce in the market where prices are good. Therefore, missing profits is an economic loss for the farmer.

Farm level losses during harvesting amounts to 3-4%, loss during threshing amounts to 3-4%, during transportation 2-3%, packaging 2%, and during storage it ranges from 10-12% on account of moisture and damage due to pest. The total extent of loss at farm level ranges between 15-20% which also includes loss due to moisture during storage. The actual grain loss accounts for 8-10%.

**Losses during milling or processing**:

Chickpea *Dal*: Chickpea is mostly consumed in the form of de-husked split *Dal*. The percentage of the full grains that is processed gives around 75-80% chickpea *Dal*. So the amount of loss ranges from 15-20% which comprises of husk, moisture and other dust particles. Milling/processing of Chickpea into *Dal* involves cleaning, removal of dust, dirt and foreign particles, grading, de-husking, splitting and polishing. Chickpea falls in easy-to-mill category of pulses. Milling loss ranges from 2-3% which includes broken kernels and powder and other dust particles. The remaining 12% is by-product (husk) that is obtained during processing and is used as poultry feed. This is not necessarily an economic loss, but this causes reduction in the amount of final product (*Dal* in this case) obtained.

Chickpea fried *Dal*: When Chickpea is processed into fried chickpea *Dal* or *Phutana*, recovery rate of the main product is 78-80%. So, the extent of loss amounts to 20% which includes husk, broken *Dal*, moisture and other dust particles. This loss of 20% includes 10% of the husk which again causes a reduction in the physical substance of the final product, moisture loss of 1%, and broken kernels 4%. The actual processing loss amounts to 4-5% which is powdered grain and wastage caused to the grain during processing.

*Dal* flour (*besan*): The processed *Dal* is further used for the processing of *besan*. The recovery in case of *besan* amounts to 95-98%. So the amount of loss in the processing of chickpea *Dal* flour (*besan*) ranges from 2-5%.

After the processing is done, there is food loss involved in packaging the product which amounts to 1-2%.

Since storage has been the main target as mentioned a number of times, some studies were later undertaken to measure the impact of various kinds of insect treatments at the storage stage (Haile, 2006). There were attempts made to estimate the post-harvest losses in the entire value chain of the commodity studied, for (e.g. Kinnow and Rice/Wheat in India) (Gangwar and Singh, 2007 and Basavaraja, Mahajanashetti and Udagatti, 2007). Transport condition and transport distance also play an important role in influencing the magnitude of Post-harvest losses (FAO, Jaspreet Aulakh and Anita Regmi). At each stage when the produce is transferred from one place to another, there is a transport loss amounting to 2-3% of the total produce which adds to the post-harvest losses.

To summarize, different factors affect the efficiency of each stage as Chickpea moves from one stage to the next stage in the supply chain. The main factors that appear to contribute to most losses is technology, infrastructure (storage) and standard conversion procedures. Therefore, these factors, along with other site-specific factors play a significant role in determining food losses from the farm to the retail outlet.

## 11. Inclusiveness of the value chain

A value chain includes the full range of activities and services required to bring a product or service from its conception to sale in its final market. More recently, the term inclusive value has been used to highlight this emphasis on including and benefiting smallholders, microenterprises, and the low-income households who operate them.

More generally, an inclusive market system is one that includes large numbers of low-income households. In addition to value chain networks for bringing products services to market, another example of an inclusive market system would be a financial market that provides financial services to all types of borrowers, including the smallest firms and low-income households. In addition to value chain networks for bringing products and services to market, another example of an inclusive market system would be a financial market that provides financial services to all types of borrowers, including the smallest firms and low-income households.

The structure of a value chain includes all the participating firms and other agents. A review of literature shows that it can be characterized in terms of the following elements:

• End markets are always the starting point for value chain analysis because the demand in the end market defines the opportunities that drive the value chain. As can be seen in the value chain map, it is possible for a value chain to have more than one market channel.

• Vertical linkages connect firms at different levels of the value chain, from input suppliers to producers, processors, wholesalers and so on, all the way to the retail level. Vertical linkages are the commercial relationships involved in bringing the product up through the value chain.

• Horizontal linkages connect firms at the same level of the value chain. Some examples of horizontal linkages are producer cooperatives and exporter associations. Important functions of horizontal linkages at the producer level include product aggregation to reduce transaction costs and the purchase of products or services in bulk to reduce unit price.

• Supporting markets include firms and organizations that provide business support services, such as financial, communication, packaging, or transport services.

Participation of a smallholder farmer is used as a measure of the inclusiveness of the value chain. It provides information on the potential scale of benefits to be gained. This table shows the domestic consumption and marketable surplus of Chickpea. It demonstrates that bulk of the produce is being marketed accounting to 93% of the total produce, which shows that smallholders market surplus is well integrated to the market and only a small proportion of the total produce is being stored for seed, and used for self-consumption.

The ratio of small and marginal famers to large farmers is 40% and 60% respectively in the village of Koilkuntla and Sanjamala Mandal. Whereas in Uyyalawada Mandal, share of small and marginal farmers is around 60% and remaining is the proportion of large farmers. The source of this information is Agriculture Offices of the respective Mandal.

**Chickpea grain use in Kurnool district**

| Name of the Mandal | Marketed (%) | Consumed (%) |
|---|---|---|
| Sanjamala | 93.5 | 6.46 |
| Uyyalawada | 93.8 | 6.17 |
| Koilkuntla | 93.52 | 6.47 |
| Kurnool | 91.42 | 8.57 |

Pulses contribute to smallholder income, as a higher-value crop than cereals, and to diet, as a cost effective source of protein that accounts for approximately 15 percent of protein intake. Moreover, pulses offer natural soil maintenance benefits through nitrogen-fixing, which improves yields of cereals through crop rotation, and can also result in savings for smallholder farmers from less fertilizer use. Chickpea has contributed in benefitting smallholder farmers in multiple ways.

**Hers is a case study-- story of a small farmer** named Sundarya in the Amadala village of Koilkuntla. He has 2 acres of land and he used to grow jowar in *Kharif*. The yield from Jowar is 20-25 quintals per acre of land and it used to fetch him price of Rs 1550-1600 per quintal. And in Rabi, he used to grow sunflower which gave him a yield of 4-5 quintals per acre of land giving him an income of Rs 3000 per quintal. He had never thought of growing Chickpea as an income source until 2005 when other farmers told him that they got seeds of

Chickpea from RARS, Nandyal which were short-duration, drought resistant variety of Chickpea and this encouraged him to allocate land to the cultivation of Chickpea. He found that Chickpea was very easy to grow and was fetching him good market price. He started leasing in land of 2 acres to grow Chickpea. Cultivation of Chickpea has benefitted him in several ways, especially in increasing the income benefits. This shows how smallholders are benefitted from allocating an area to production of Chickpea.

## 12. Challenges and Recommendations

The value chain analysis attempts to identify the various impediments in order to develop possible interventions that can improve the performance of value chain. But the involvement of many actors in the value chain reduces the farmer's share in the consumer rupee.

Processors reported that price negotiation has become a problem as farmers are not willing to sell the produce at the prevailing market price which is not up to their desired level.

Rayalaseema belt of Andhra Pradesh is considered to be an important region for providing Chickpea, processed *Dal* and *phutana* to its neighbouring states like Tamil Nadu, Maharashtra, Karnataka and Chennai. So, most of the produce is being sold to these states. Onereason is the increased demand from these states. The other factor that contributes to selling the produce in these states is the prevalence of VAT of 4% in excess of market cess of 1% which is applicable for selling the produce in Andhra Pradesh.

Processors in Ananthapur district reported that they faced a problem in the issue of way bill. They were not aware that the entire system has been made online and they could generate as many way bills as required compared to earlier times when it was a time taking procedure. The source of this information is Commercial Tax Officer, Kurnool.

There is problem of power supply in Ananthapur district, as there is a power holiday every Tuesday due to which the processing unit cannot operate.

Processing units demanded that the VAT of 4% on pulses in Andhra Pradesh to be removed, as it is leading to an increase in 'Zero Business transaction' which leads to black marketing or hoarding.

This question was posed before the CTO stating that processors are incurring lesser returns when compared to other states where there is no tax levied on pulses. It was being explained that taxing of a particular commodity is purely vested with the State government. It is at the discretion of the states to decide whether to levy a tax on a particular commodity or not and what rate to charge. Levying a tax on any agricultural commodity depends on two factors:

- Importance of the commodity to be taxed
- Volume of the produce

Chickpea has acquired an important position in the production of total pulses in Andhra Pradesh despite the constraints or the bottlenecks present in the value chain system, Chickpea revolution has been successful.

## 13. Government intervention

India is undergoing dramatic policy and institutional reforms. Policy makers and planners in India recognise quite explicitly the importance of pulses in the diet of less-affluent people and have consistently drawn up plans to secure adequate domestic supply of pulses (AgWA, 1997). Trade statistics indicate a demand supply imbalance for pulses in Asia. Overall the region remains a net importer, importing 7 million tonnes in 2009-11 and exporting 3 million tonnes in 2009-11 (FAO stat). Moreover the imports have increased over time, largely due to increasing imports by India and Pakistan. Owing to increased import demand, countries that traditionally did not grow pulses are significant exporters. There is a need to bring a supply-demand balance.

To encourage pulse consumption, the Government of India (GOI) has removed trade barriers on imported pulses. This was due to the dramatic increase in domestic pulse production.

Coupled with this is the GOI's decision under the World Trade Organisation's (WTO) rulings and the globalisation of world economies to a phased reduction of their long-standing restrictions on imports of agricultural products.

Despite these policy reforms, most crops in India are subject to restrictions on domestic trade, regulated under the Essential Commodities Act of 1955. Some of these restrictions include: compulsory levies on millers, stocking limits for private traders, milling reserved for only small sector industries, occasional restrictions of interstate movements, and for most crops prohibition of future trading (Gulati, 1998; Kelley, 1999).

Additionally, the policy changes in major exporting countries also play an important role in determining the domestic prices. To mitigate the rising prices, most countries resort to trade barriers such as export restrictions and export taxes. India started exporting food in the recent past and has now imposed bans on exports of essential commodities in order to prevent further price increase in the domestic market. The Cabinet Committee on Economic Affairs approved the prohibition on export of pulses up to March 31, 2014.

## 14. Conclusion

Some keys results have been presented below:

- There have been tremendous changes in the spread and production of Chickpea in India over the last few decades. Its production dipped when it was substituted by more profitable crops in the northern states with cooler climates and longer growing seasons. But the shortfall in production increased its relative price and spurred its

production in the non-traditional areas. The research system has responded to the challenge by developing short duration and adaptability to warmer climates. As the farmers saw an opportunity to earn profits, they allocated better lands to the cultivation of Chickpea.

- The volume of chickpea getting transferred to other places for processing or for direct consumption is being recorded at the check-posts. All the produce transported to other places is charged with 4% VAT and 1% market cess.

- The economics of cultivation reveal Chickpea is able to provide handsome returns to the farmers with a B:C ratio above two. Most of the farmers started growing Chickpea as there were handsome returns from the crop.

- Farmers sell most of the Chickpea produced and retain very small quantities for their own consumption. Most of the produce in Kurnool district is stored in warehouses. It was reported that there are six cold storage units in Kurnool district, which is encouraging farmers to make use of the cold storage units.

- Chickpea marketing channel in the area of study is found to be more complicated as it involves processing of grains. The price spread calculated reveals that whole chickpea has the highest producer's share in the consumer's rupee i.e. 70% followed by Chickpea split *Dal*, chickpea *Dal* flour and fried chickpea *Dal*. As the amount of value addition increases, the share of producer (farmer) in consumer rupee diminishes because of higher marketing costs and margins taken away by traders, processors, wholesalers and retailers. Returns for farmers can be increased by either reducing the number of intermediaries or by integrating the farmers with value addition.

- There is another institutional channel called the National Agricultural Cooperative Marketing federation of India limited (NAFED) which acts as a nodal agency for procuring grain at MSP. NAFED has been procuring grains through APMARKFED which is a state level agency. The estimated quantity of procurement of last year amount to 1, 45,000 quintals.(ADM, Agricultural Marketing Committee, Kurnool).

- Participation of a smallholder farmer is used as a measure of the inclusiveness of the value chain. It is reported that bulk of the produce is being marketed accounting to 93% of the total produce, which shows that smallholders market surplus is well integrated to the market. The data on other indicators for measuring inclusiveness of smallholders like the farm holding size, share of chickpea cultivation out of the total area was found to be either incomplete or was unavailable.

- Stronger linkages between smallholders and market and reducing transaction costs will lead to a more efficient value chain where the demand signal is clearly communicated to the producers. Enhancing the efficiency of chickpea aggregation will help to eliminate bottlenecks in the value chain.

- The strength of market linkages between farmers and traders operating in the value chain needs to be enhanced through better market linkages and development of mutually beneficial contractual arrangements. Better farmer–trader linkages would cushion themselves against widely fluctuating prices while guarantying an outlet for their surplus production.

- An attempt has been made to study the inclusiveness at each stage of value chain and it was found that all the market intermediaries are benefitted along the value chain especially traders, processors, wholesalers and retailers with their margins ranging from 5-20 % of the total sales revenue. Famer is at the risk of least benefitting from the value chain. The producer's share in consumer rupee can be increased by encouraging farmers to take up the value addition at farm level.

- The value chain analysis shows that the value chain is rather competitive and profitable for all the market functionaries involved in the value chain. Farmers are least benefitted in the entire value chain as they don't have a strong integrating power or holding power as compared to traders, processors, wholesalers and retailers. There is a need for institutional innovations to reduce transaction costs through better coordination of marketing activities of smallholder farmers and increased exchange of information along the value chain. The corollary to this would be enhanced availability of better farm–to–market road links and transport and storage facilities.

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