

**PROCESSING AND BUSINESS PROSPECTS FOR
MANGO PULP**

A PROJECT REPORT

Submitted by

Raju Kushwaha

Reg. No. - 04-0883-2008

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of

**MASTER OF BUSINESS ADMINISTRATION
(INTERNATIONAL AGRIBUSINESS)**

**UNDER THE GUIDANCE
OF**

**Dr. SANJIV KUMAR
(Assistant Professor)**

INTERNATIONAL AGRIBUSINESS MANAGEMENT INSTITUTE

ANAND AGRICULTURAL UNIVERSITY

ANAND 388 110

SEPTEMBER – 2010

INTERNATIONAL AGRIBUSINESS MANAGEMENT INSTITUTE
ANAND AGRICULTURAL UNIVERSITY
ANAND -388110

CERTIFICATE

This is to certify that the project entitled “**PROCESSING AND BUSINESS PROSPECTS FOR MANGO PULP**” of M.B.A (International Agribusiness) embodies bonafide research work carried out by **Raju Kushwaha** under my guidance and supervision and that no part of this project work has been submitted for any other degree. The assistance, guidance and help received during the course of investigation have been fully acknowledged.

Place: IABMI, AAU

Anand

Date: 28/07/2010

(Dr. Sanjiv Kumar)

Major Advisor

**INTERNATIONAL AGRIBUSINESS MANAGEMENT INSTITUTE
ANAND AGRICULTURAL UNIVERSITY
ANAND -388110**

CERTIFICATE

This is to certify that the project entitled **"Processing and Business Prospects for Mango Pulp"** submitted by **Raju Kushwaha** to the Anand Agricultural University, Anand in partial fulfillment of the requirement for the degree of M.B.A. (International Agribusiness) after presentation and defended by the candidate before the following members of the Advisory Committee. The performance of the candidate in this project has been found satisfactory; we therefore, recommend that the project report may be approved.


(Dr. G. B. Valand)
Principal


(Dr. Sanjiv Kumar)
Major Advisor


(Mr. Abid Deraiya,
MD, Relish Agro Food Pvt. Ltd.)
Committee Member


(Dr. K.B. Kathiriya,
Research Scientist,
Vegetable Research Station, AAU)
Committee Member


(Dr. R. S. Pundir
Associate Professor, IABMI, AAU)
Committee Member

Place: IABMI, Anand
Date: 28/07/10

JISL/JV/2010

August 20, 2010.

TO WHOM SO EVER IT MAY CONCERN

THIS IS TO CERTIFY, THAT **MR. RAJU KUSHAWAHA** A STUDENT OF **MBA (IAB)** FROM **ANAND AGRICULTURE UNIVERSITY, ANAND.** HAS SUCCESSFULLY COMPLETED HIS SUMMER PROJECT REPORT ON **"PROCESSING AND BUSINESS PROSPECTUS FOR MANGO PULP IN GUJRAT"** IN OUR ORGANISATION FROM **05TH FEBRUARY, 2010 TO 15TH JUNE, 2010.**

WE WISH HIM BRIGHT SUCCESS.

FOR JAIN IRRIGATION SYSTEMS LTD.,



G. R. PATIL
ASSTT. MANAGER – HRD

DECLARATION

I hereby declare that the project entitled “**PROCESSING AND BUSINESS PROSPECTS FOR MANGO PULP**” Submitted for the M.B.A (International Agribusiness) Degree is my original work and this has not formed the basis for the award of any degree, associate ship or other similar titles.

Place: IABMI, AAU

Name: Raju Kushwaha

Anand

Reg. No. 04 - 0883 – 2008

Date: 28/07/2010

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Date:

Place: Anand

RAJU KUSHWAHA



ABSTRACT

PROCESSING AND BUSINESS PROSPECTS FOR MANGO PULP

Name of student

Raju Kushwaha

Reg. No. 04-0883-2008

Major advisor

Dr. Sanjiv Kumar

(Assistant professor)

INTERNATIONAL AGRI-BUSINESS MANAGEMENT INSTITUTE

ANAND AGRICULTURAL UNIVERSITY

ANAND 388 110

ABSTRACT

Mango with many versatile properties has naturally found application for processing into various products unparalleled by any other fruit. It is however estimated that 0.22% of mangoes produced in the world is only utilized for processing. Green mangoes are processed into traditional products like pickle, brine stock and chutney. Instant mango pickle, drum-dried green mango powder, production of raw mango beverage base is the new developments.

Ripe mangoes are processed into canned slices, pulp, beverages like- RTS beverage, nectar and juice, dehydrated products like mango fruit bar, mango cereal flakes, mango powder, strained baby foods, etc. Mango slices in nectar, mango concentrate, mango aroma concentrate, low viscosity and low

pulp containing mango beverage base, mango pulp concentrate by evaporative technique by split process and by partial drying and cut back technique, mango aroma concentrate and identification of aroma compounds, aseptic bulk packing of pulp and concentrate, mango beverage in tetra pack, etc., are the recent developments. India exports the mango pulp mainly in countries like Saudi Arab, Netherland, U.A.E., Yemen Republic, U.K., Japan, Kuwait and U.S.A. In 2008-09 export of mango pulp from India was Rs. 615.33 crores and in terms of quantity it was 1433 lakhs kg. Contribution of India towards mango pulp export was about 1.5% in the same year.

To understand farmers' behavior primary survey of farmers having 100 numbers of mango trees or more than 100 numbers of trees in orchard, APMCs and food processing industry in Gujarat (Junagadh, Navasari and Valsad) was conducted and information gathered by using structured questionnaire. Data obtained by this survey was analyzed by tabular and graphical method. This project will help company to understand such factors, farmers and APMCs behavior, so that it may be helpful for the company to modify or to develop new strategy for purchasing raw material to grab more market. This project also helps to identify the key players in mango processing industry in Gujarat.

It will help the company to start mango processing plant in Gujarat. Company already has well developed processing plant (mainly onion dehydration) in Padara near Vadodara. This project will let the company know from where they can get the raw material and which channel they should adopt to increase the efficiency. For procurement of raw material i.e. mango Junagadh (54016 MT production), Navasari (48480 MT production) and Valsad (45120 MT production) are the three potential districts which collectively account for 50% of mango production in Gujarat.

Two channels exist for movement of mango from farmers to the industry. In first channel farmers sell mango directly to the wholesalers. In the second channel local vendors purchase mango from farmers and then sell to the wholesalers. The industry purchases their raw materials from these wholesalers. For the two districts Navasari and Valsad, movement of Keshar, Alphanso, Rajapuri and Desahari varieties of mango areas and for Junagadh as only keshar is grown were studied. It was established that channel without local vendors is more efficient.

Gujarat govt. is promoting the agro industry by way of subsidy for establishing new unit upto 6% with ceiling of Rs100 lakhs. Other forms of subsidy are also available.

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I



INTRODUCTION

I. INTRODUCTION

1.1 Company Profile

The journey of Jain Irrigation began in 1887 when their forefathers left the deserts of Rajasthan, their home state, in search of water and food and reached Waked, at the foothills of the famous Ajanta Caves. It started farming as a means of livelihood.

In 1963 selling kerosene in pushcart, the young law graduate, Bhavarlal Jain, founded the family business in trading and the family partnership with a meager Rs. 7,000, accumulated savings of three generations, as capital. Soon, agencies for two wheelers, auto vehicles and automobile accessories were established in quick succession.

1.1.1 Story of Success

1.1.1.1 Trading

Inspired by a quote, "Agriculture: a profession with future" young Jain added dealership of tractors, sprinkler systems, PVC pipes and other farm equipment. In order to broad base the agri-business, agencies for farm inputs such as Fertilizers, Seeds, Pesticides were also added. Sales grew from Rs. 1 million in 1963 to Rs. 110 millions in 1978, a phenomenal increase of 110 times. These formative years helped us build a unique and lasting enterprise. This was achieved through consistent high standards of performance and personal behavior on the one hand and a strong sense of commitment for meeting targeted volumes and for payment of debts in time, on the other. Dealings with national and international principals were a contributing factor towards building these attitudes. In time, it came to be recognized as a reputable, trustworthy and

prestigious house. This background augured well for an entry into industrial ventures.

1.1.1.2 Refined Papain

Jain irrigation Ltd. took over a 14 year-old sick Banana Powder Plant in April 1978 at a high auction price of Rs. 3 million while it. only had Rs. 0.2 million as inevitable surplus. The plant was quickly modified for the production of Papain from Papaya latex. In December 1978, the founder traveled to New York in search of customers for Jain Papain. The competition for purchase of raw materials at home and for sale of Papain abroad was stiff and stifling. However, jain irrigation ltd. developed purified Papain through ceaseless in-house R&D and emerged as the 'Number One' supplier of the highest purity refined Papain.

1.1.1.3 PVC Pipes

In 1980, manufacturing of PVC Pipes commenced with a small annual capacity of 300 MILLION TONS's which was increased to over 35,600 MILLION TONS's per annum by 1997, making it the largest single producer of PVC Pipes in the country. A close-knit dealer distribution network in the rural areas coupled with continuous automation and up gradation of product facilities and in-house R&D for maximum capacity utilization has kept it at the forefront. This further helped it to expand the range to Casing & Screen Piping Systems thereby continuing to contribute to the growing export volumes.

1.1.1.4 Micro - Irrigation Systems

Beginning in 1989, Jain Irrigation Ltd. toiled and struggled to pioneer Water-management through Micro Irrigation in India. It has successfully introduced some hi-tech. concepts to Indian agriculture such as 'Integrated System

Approach', One-Stop-Shop for Farmer, and 'Infrastructure Status to Micro Irrigation & Farm as Industry'. It has come a long way.

1.1.1.5 Food Processing

In 1994 Jain irrigation Ltd. set-up world class food processing facilities for dehydration of onion, vegetable and production of fruit purees, concentrates and pulp. These plants are ISO 9001 & HACCP certified and Meet International FDA statute requirements. Combining the modern technologies of the west with the vast, mostly untapped agriculture resources of India, using the local human resources and inculcating the culture of excellence in quality and total customer service. Jain irrigation Ltd. has set a goal 'to become a major and reliable global supplier of food ingredients of finest quality.'

Today with over 3000 committed employees strength worldwide, they have established there Leadership in diverse products like Micro & Sprinkler Irrigation, Agricultural Inputs, Agro-Processed Products, Plastic Pipes & Sheets.

1.1.2 Products

- Drip Irrigation Systems.
- Sprinkler Irrigation Systems.
- Valves, Water Filters.
- Fertigation Equipments.
- Green Houses.
- Plant Tissue Culture.
- Nursery Plants and Systems.
- Bio Fertilizers.
- Processed Food- Fruit Processing, Onion and Vegetable Dehydration.
- PVC Pipes and Pipe Fittings.

- PE Pipes and Pipe Fittings.
- SWR Pipes and Fittings.
- Plastic Products - PVC Sheets, PC Sheets.
- Solar Water Heating Systems.
- Turnkey Project Services.
- Agricultural and Engineering Consultancy and many more...

1.1.3 Financial Highlights

Table 1.1 Financial Highlights

Turnover	US\$ 456 million	
Compounded growth rate (CAGR) for past 5 years	41%	
Exports from India operations	US \$ 115 million	
Market Capitalisation	Over US\$ 1.1 Billion	
Equity Shares & FCCB listed in Exchanges	India (BSE, NSE), Singapore, Luxembourg	
Acquisitions during 2006-07		12
- Within India	7	
- Outside India	5	

1.1.4 Global presence

Table 1.2 Global presence

Countries	110
Plants	21
Offices	64
Warehouses / Depots	28
Distributors	3,009
Global workforce	More than 5,000
Agri and irrigation Scientists: Engineers, Technologists and Technicians	Over 1000

1.1.5 Awards

Table 1.3 Awards

International	4	150
National	115	
State	31	

1.1.6 Certifications

Table 1.4 Certifications

All divisions	ISO-9001:2001
Irrigation, Plastic Piping & Plastic Sheet division's	ISO-14001:2004
Food division	ISO-22000:2005, BRC, HACCP, SGF & KOSHER
Agriculture division	EUREPGAP

Jain Irrigation has been named as one of the eight Indian companies expected to emerge as challengers to the World's leading companies by Standard and Poor recently in May 2007.

1.1.7 Achievements

1.1.7.1 Agriculture & Irrigation Division

- Pioneers of Micro Irrigation Systems in India.
- The only manufacturer of complete drip irrigation systems in the world.
- Globally second and the largest irrigation Company in India.
- One-stop high-tech agricultural shop.
- Nurtures a sprawling 2000 acre Hi-Tech Agri Institute.
- The largest manufacturer of Tissue culture Banana Plants in India.
- Largest pool of Agricultural Scientists, Engineers & Technicians in Private Sector.

1.1.7.2 Pipe Division

- The largest manufacturer of Plastic Pipes in India.

1.1.7.3 Plastic Sheet Division

- The largest manufacturer of PVC & PC sheets in India and globally amongst first 5 Companies.
- The only manufacturer producing widest range of Plastic Sheets (PC & PVC) under one roof.

1.1.7.4 Food Processing Division

- The largest manufacturer of Mango pulp, puree and concentrate.
- Globally second largest manufacturer of dehydrated onion.

1.2 Overview of food processing industry

Food Processing is a highly diverse industry sector comprising ten major sub-sectors: Fruits and vegetables, Grains, Milk and milk products, Fisheries, Meat and poultry, Plantation products, Alcoholic and non-alcoholic beverages, Confectionary, Packaged/Convenience foods and Health foods and supplements. The growth of the sector is dependent upon high per capita disposable incomes, urban lifestyles and consumer tastes and preferences in favor of ready to eat, easy to prepare and hygienically prepared foods. As such, growth of the sector has been the highest in developed economies, especially across Western Europe, North America, Japan and Australia.

Agro processing could be defined as set of techno economic activities carried out for conservation and handling of agricultural produce and to make it usable as food, feed, fiber, fuel or industrial raw material. The Food Processing Industry sector in India is one of the largest in terms of production, consumption, export and growth prospects.

As much as 42% of the food industry is in the organized sector and 33% in the small scale, tiny and cottage sectors. The value addition to agricultural commodities is less than 10%. At the end of the year 2007-2008, India was producing 900 million tonnes (Mt) of biological materials per year including food grains, oilseeds, fruits, vegetables, sugarcane, milk, eggs, meat, fish, tea, coffee, fiber crops, floricultural produce, forest produce and so on.

1.3 Status of India in Agro Processing

India is one of the largest food producers in the world. India is the third largest market for alcoholic beverages in the world. Maharashtra has emerged as an important state for the manufacture of wines. There are more than 35 wineries in Maharashtra. Groundnut is grown in nearly 100 countries. India is one of the

major exporting countries of groundnuts after china. India accounts for about 15% of the world's production of vegetables. India is one of the largest producers of oil/vanaspati products in the world providing direct & indirect employment to one million people.

India produces annually 114 Mt of milk (highest in the world), 185 Mt of fruits & vegetables (second largest), 485 million livestock (largest), 230 Mt food-grain (third largest), 7 Mt of fish (3rd largest), 489 million Poultry and 53000 Mn eggs. 200 Mn consumers expected to shift to processed food by 2010. More than 70% of the total world Jiggery production is done in India. India is the major producer of dried & Preserved Vegetable Like Preserved Onions, Cucumber & Gherkins, Mushrooms and truffles, Green Pepper in Brine, Dried Truffles, Dehydrated Garlic Powder, Dehydrated Garlic Flakes, Garlic Dried, Potatoes Dried, Grams, Grams Dal, Onion Prepared/Preserved etc.

1.4 Status of Gujarat in Agro Processing

Gujarat has highest production in the world for Castor (67%), Fennel (67%), Cumin (36%), Isabgol (35%), and Groundnut (8%), and Guar seed (6%). Gujarat has shown annual growth in Oilseeds and Cotton-51%, Pulses-49%, Cereals: 36%. State has emerged front runner in several sectors like Dairy Units, Fisheries Sector, Animal husbandry, Oilseed processing etc.

1.5 Exports from India

Table 1.5 Export of process foods from India

Products	2006-07 (crores)	2007-08 (crores)	Countries
Alcoholic Beverages	221.94	338.56	UAE, Netherland, Angola, France, Singapore
Non-alcoholic Beverages	1195.46	1395.68	UAE, Netherland, Angola, France, Singapore
Cereals Preparations	598.8	677.35	USA, UK, UAE, Nepal, Sri Lanka
Dried & Preserved Vegetables	-----	429.94	Germany, USA, Bangladesh, France, Spain
Groundnut	798.46	1054.08	Indonesia, Philippines, Malaysia, Ukraine, UK
Jaggery & Confectionary	873.46	2810.68	UAE, Yemen, Bangladesh, Indonesia, Malaysia
Mango Pulp	505.83	509.69	Saudi Arabia, Netherland, Yemen, UAE, Kuwait

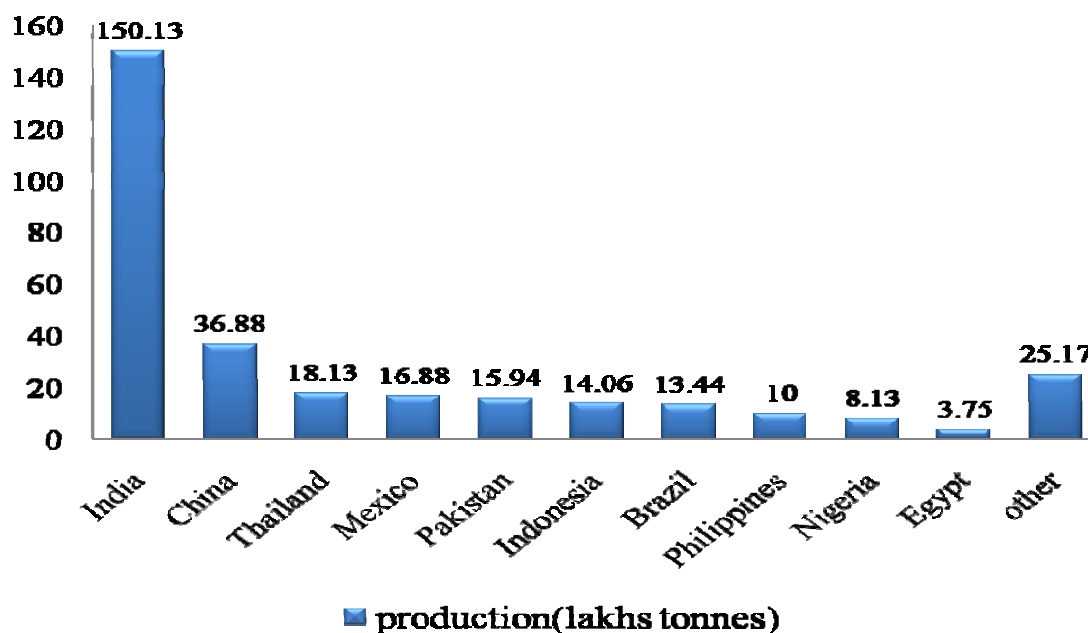
1.6 Objectives

- ❖ To study the availability of raw material.
- ❖ To study the mango processing & product segments in Gujarat.
- ❖ To determine the most efficient market channel for mango from farmer to process unit.
- ❖ To study the regulatory requirement and intervention for mango processing units.

II. REVIEW OF LITERATURE

2.1 International scenario

The total world area under mango was 43.69 lakhs ha and World production of mango in 2007-08 was 312.51 lakhs tonnes as against 175.17 lakhs tones during 1991, registering a marginal growth of 5.6 per cent per annum. India ranks first among world's mango producing countries accounting for about 46% of the global area and 48% of the world production. Other major mango producing countries with their percentage share in the global production include China (11.8%), Thailand (5.8%), Mexico (5.4%), Pakistan (5.1%), Indonesia (4.5%), Brazil (4.3%), Philippines (3.2%), Nigeria (2.6%) and Egypt (1.2%). Worldwide production is mostly concentrated in Asia, accounting for 75% of the global production.



Source: N.H.B. 2007-08

Fig 2.1 International mango production scenario

The world trade in mango consists of an export of 9.29 lakhs tonne valued at 6189.17 lakhs US\$ and imports to the tune of 7.93 lakhs tonne estimated at 7592.35 lakhs US\$. Among internationally traded tropical fruits, mango ranks only second to pineapple in quantity and value. Major markets for fresh and dried mangoes are Malaysia, Japan, Singapore, Hong Kong and the Netherlands and canned mangoes are Netherlands, Australia, United Kingdom, Germany, France and USA. Southeast Asian buyers consume mangoes all year round. Their supplies come mainly from India, Pakistan, Indonesia, Thailand, Malaysia, Philippines, and Australia and most recently from South Africa. The varieties in demand at the international market include Kent, Tommy Atkin, Alphanso and Keshar. Each exporting country has its own varieties, which differ in shape, color and flavor. Prices are very low for Indonesian and Thailand fruit and are on the higher side for Indian fruit. In the United States of America, the prices vary with the season. Higher prices prevail during February and March, when mango availability is lowest. The major chunk of international trade in fresh mangoes takes place within short distances. Mexico, Haiti and Brazil account for the majority of North America's imports. India and Pakistan are the predominant suppliers to the West Asian market. Southeast Asian countries get most of their supplies from the Philippines and Thailand. European Union buyers source mangoes from South America and Asia. Although Asia accounts for 75 percent of the world production, its dominance does not translate into international trade. Asian producers find it easier to expand sales to the European Union. Europe's acceptance of different varieties is greater, because of a large demand from Asian immigrant groups. Phytosanitary restrictions are less stringent. Transportation costs are not as big a factor in exporting mangoes to the European Union as in exporting to the United States market. India and Pakistan are able to compete with non-Asian suppliers to the European Union, where as proximity gives Mexico and Haiti a clear advantage in supplying it to

the United States market. Fifty-four percent of European Union imports enter during the periods May to July and November to December, with peak imports in June. French imports reach peak in April and May, whereas United Kingdom imports are concentrated during the May to July. German imports are spread more evenly throughout the year. Of the top suppliers, Brazil provides chiefly during the period November to December, the United States during June to October, South Africa during January to April and Venezuela during April to July. Pakistan supplies the majority of its exports to the European Union during June and July; Indian exports take place mainly during the month of May.

2.2 National scenario

Mango, called the king of fruits in India, accounts for 54 percent of the national fruit production of 22.168 million tons a year. It occupies 42 percent of the country's 24.87 million hectares land under fruit cultivation. India exported 79,060.88 MT of fresh mangoes with the value of Rs. 141.93 Crores (USD Million 31.48) in 2007-08. The major varieties of mangoes exported include Dasehari, Alphanso, Keshar, Banganpalli, Langra, Chausa, Mallika and Swarnrekha. The Major markets for Indian mangoes are U.A.E, Bangladesh, U.K, Saudi Arabia and Nepal. India is estimated to account for about 60 percent (9.5 million tonnes) of the world's mango production of 15.7 million tones. The major production areas in the country are in the state of Andhra Pradesh, Uttar Pradesh, Karnataka, Bihar, Gujarat and Maharashtra.

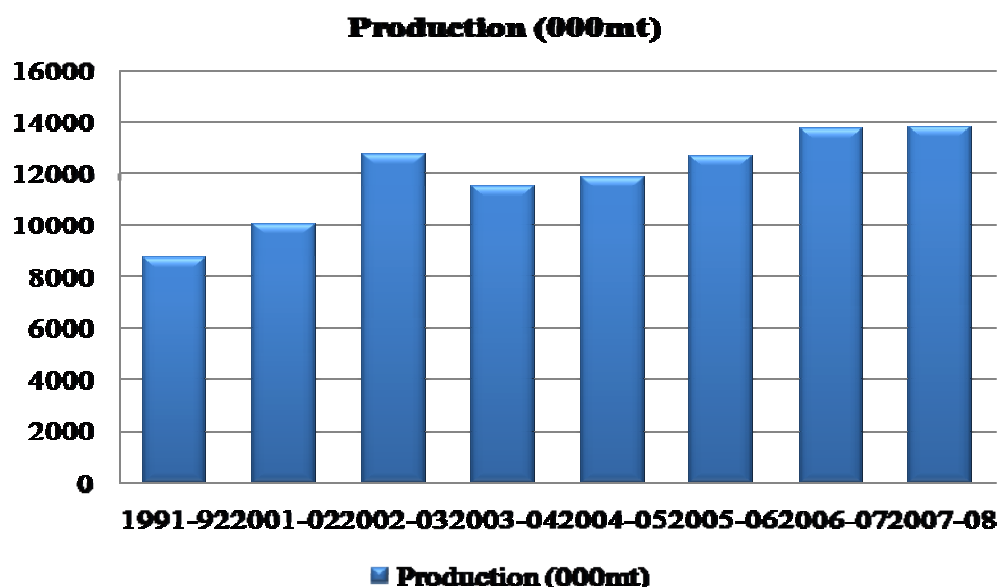
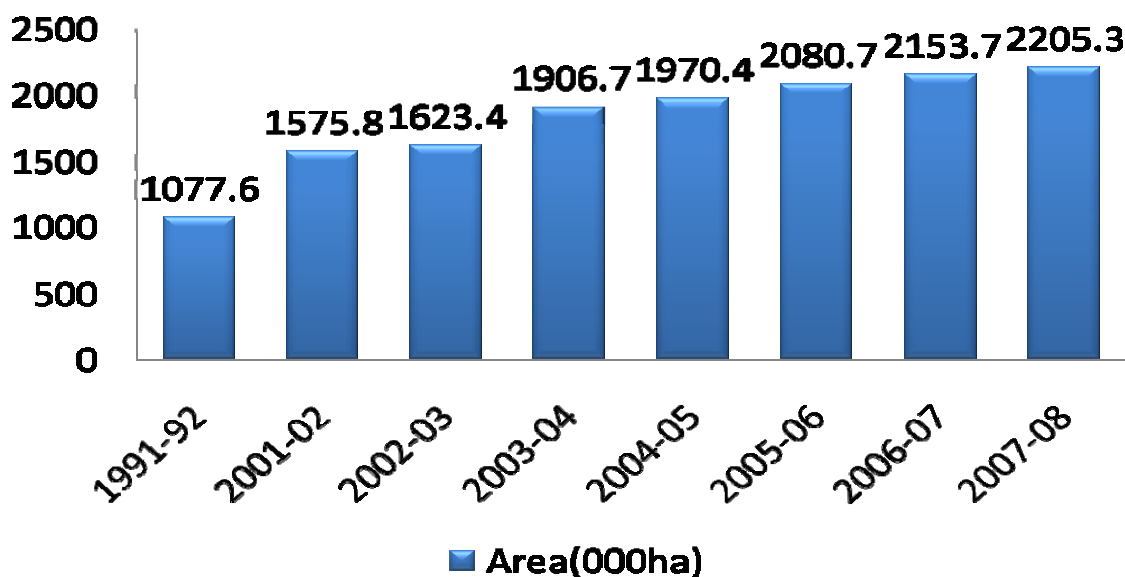


Fig 2.2 National scenario of mango production

Source: N.H.B. 2007-08

Mango is one of the important fruit crops grown in India. In terms of area, India ranks first in the world with over 2205.3 (000ha) during 2007-08 with the production share of around 48 per cent. In the agricultural year 2007-08, mango accounted for around 38 per cent of the total fruits area and 22 per cent of the production of fruits in the country. Although mango is cultivated in all the states, the major mango growing states are Uttar Pradesh, Andhra Pradesh, Karnataka, Tamil Nadu, Maharashtra, Gujarat, Orissa, Kerala and West Bengal. These nine states together accounted for over 92.6 per cent of area and 95.4 per cent of production of mango in the country. The production has increased from 8715.6(000mt) in 1991-92 to 13792.1 (000mt) in 2007-08 with 1.6 per cent growth per annum during same period.



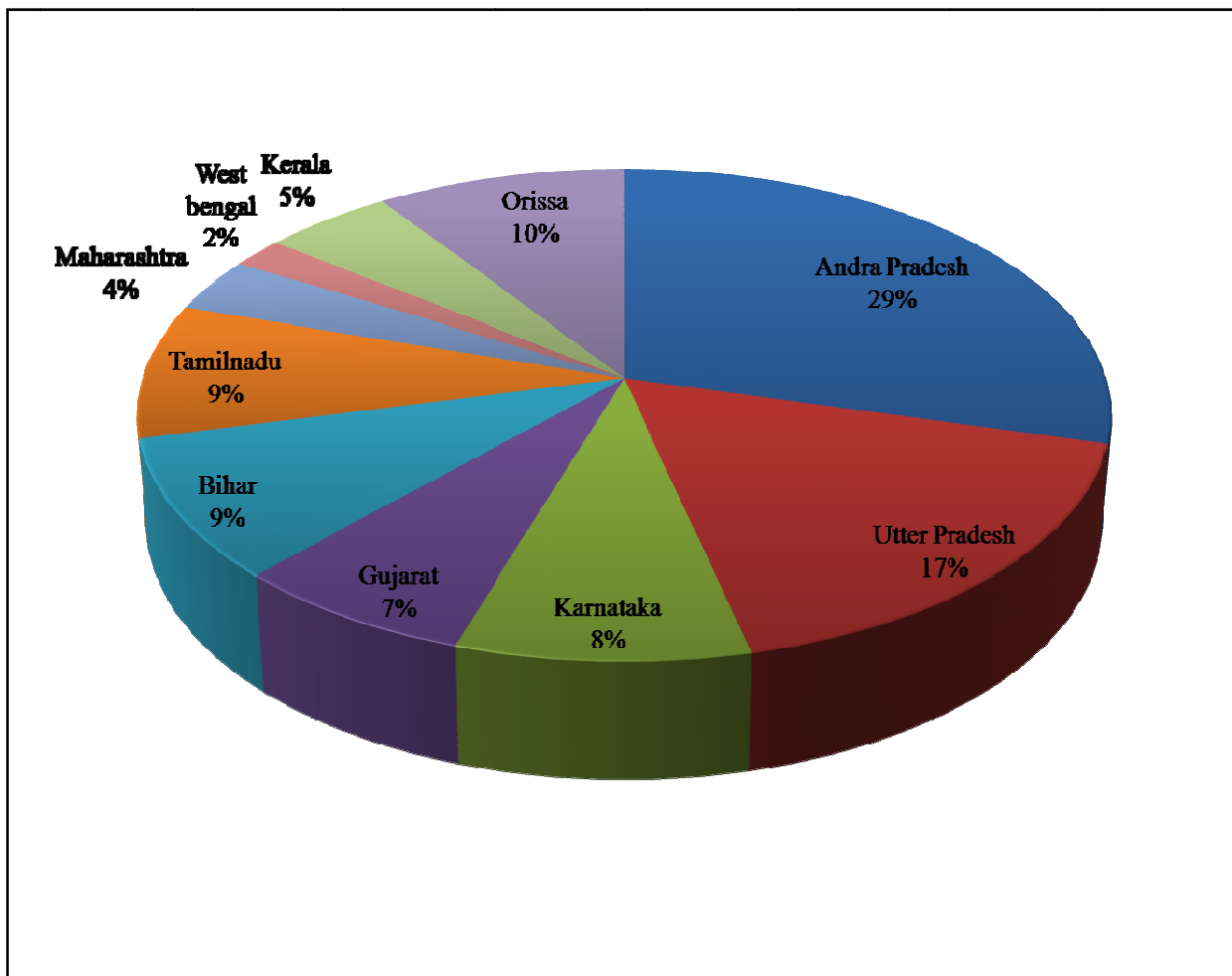
Source: N.H.B. 2007-08

Fig 2.3 Area under national mango production

The above figure shows the increase in Area of mango cultivation in India. Area has increased from 1077.6 thousand hectare to 2205.3 thousand hectare during 1991-92 to 2007-08. Showing a growth of about 105%

2.4 State wise area, production and productivity of Mango

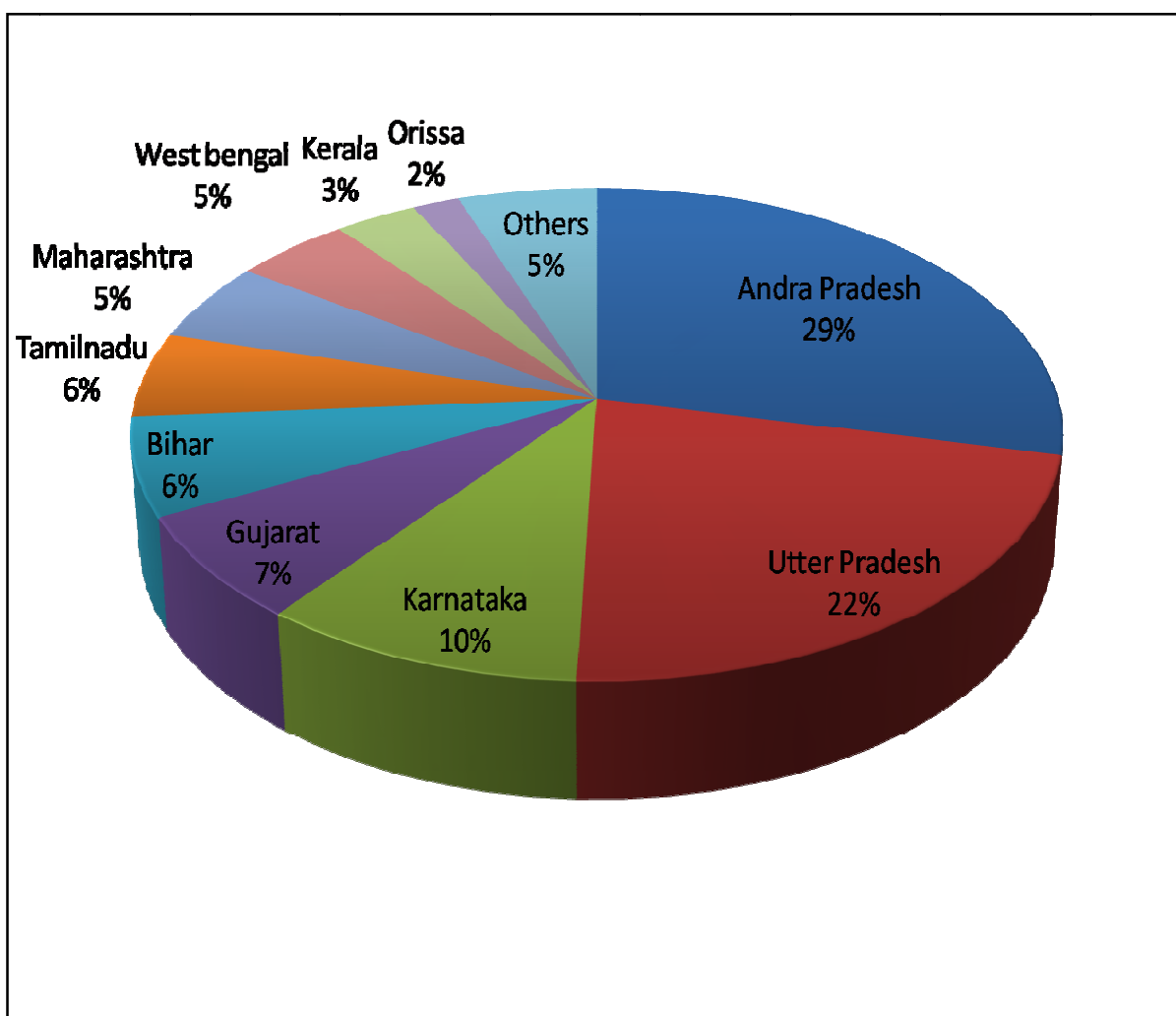
A large variety of mangoes are grown in India. There are more than thousand mango varieties in India. However, about 30 varieties are grown on commercial scale in different states. The region wise popular varieties grown in different parts of the country comprise: Alphonso and Keshar from Western India, Banganpalli, Totapari and Neelam from southern states, Fazli from Eastern States and Langra, Chausa and Dasehari from Northern States.



Source: National Horticulture Board (2008-09)

Fig 2.4 State wise share in area of Mango cultivation area

The above figure shows the share of different states in total area of mango cultivation in India. Gujarat occupies the sixth position for area under cultivation in India.



Source: National Horticulture Board (2008-09)

Fig 2.5 State wise share in area of Mango production

The above figure shows the state wise share of mango production in India. Andhra Pradesh is at the top position followed by Uttar Pradesh. Gujarat stands at fourth position.

2.4 Mango Pulp

Gujarat is the world famous for Mango production and for Mango Pulp. Over 40,000 hectares are under mango cultivation, producing 3.5 lacs MT of Mango Fruits every year. In Gujarat many process industry were running mango process. Industries are located right in the growing belt of Top Quality Mangoes and produce top quality mango pulp.

2.4.1 Description

It produce large quantity of mango pulp (Totapari, Alphanso and keshar) ever year under Good Hygienic Condition, and export the production to Middle East, UK, and East Asia Countries and also mango pulp consumed in domestic market.

2.4.2 About Indian Mango Pulp

Mango Pulp is made from selected varieties of Fresh Mango Fruit. Fully matured Mangoes are harvested, quickly transported to the fruit processing plant, inspected and washed. Selected high quality fruits go to the Controlled Ripening Chambers; Fully Ripened Mango Fruits are then washed, blanched, pulped, deseeded, centrifuged, homogenized, concentrated when required, thermally processed and aseptically filled maintaining commercial sterility.

2.4.3 International market of mango pulp

Table 2.1 Export of Mango pulp from India in 2008-09

Country	Value(Rs.)	Quantity(Kg.)	Percentage Share
Saudi Arab	2,011,665,990	53,563,566	8.16
Netherland	1,066,269,429	19,311,306	4.32
U Arab Emts	849,781,981	21,895,700	3.45
Yemen Republc	533,914,810	15,562,605	2.17
U K	375,155,655	8,204,036	1.52
Japan	373,099,105	4,971,261	1.51
Kuwait	296,367,641	7,568,588	1.2
Sudan	239,390,535	4,867,868	0.97
U S A	229,054,637	4,342,876	0.93
France	178,659,795	3,012,642	0.72
Total	6,153,359,578	143,300,448	

Source: DGCIS Annual Export (2008-09)

2.4.4 Keshar mango pulp

Keshar Mango Pulp is manufactured and processed by extracting pulp of fresh clean and ripe mangoes picked at the suitable stage of ripeness. The preparation process includes cutting, de-stoning, extraction of pulp. Industries are following standard techniques to ensure safe and hygienic production. They use approved preservation techniques to keep our products rich in nutrients, flavor and taste.

Keshar mango variety is relatively rich in elements like calcium, phosphorous, iron, potash, magnesium, protein, carbohydrates and vitamins, especially A and C and has low saturated fat. Keshar Mango Pulp is best suited for alteration in

juices, nectars, drinks, jams, fruit cheese and various other kinds of beverages. It can also be used in puddings, bakery fillings, fruit meals for children and flavors for food industry, and to make delicious ice creams, yoghurt and confectionery.

Table 2.2 Product description of keshar mango pulp

Keshar Mango Pulp Specifications	
PARAMETERS	VALUE
Color	Golden Yellow
Taste	Typical to Kesar Mango
Foreign Matter	Absent
Total Soluble Solid (TSS)	Minimum 16 Brix at 20° C
Acidity (as citric acid)	0.4 – 0.6 % W/W
pH Value	3.5 to 4.3
Preservative	Absent
Ascorbic Acid	Natural
Packing	MS Drum painted wide mouth with Aseptic Bag and polyliner.
Net Weight	215 ± 1 Kg.
Shelf Life & Storage	18 months at normal ambient condition. Store in cool condition and avoid exposure to direct sunlight. Ideal storage temperature 4 – 8° C

2.4.5 Alphanso mango pulp

2.4.5.1 Product Description

Alphanso Mango Pulp is made from select Alphanso variety a mango, ripened under controlled atmospheric conditions. The preparation process includes cutting, de-stoning, refining and packing. In case of aseptic packing the pulp is sterilized and packed in aseptic bags. The refined pulp is also packed in cans, hermetically sealed and retorted. Frozen pulp is pasteurized and deep-frozen in plate freezers. The process ensures that the natural flavor and aroma of the fruit is retained in the final product.

2.4.5.2 Usage

Essentially a prime table fruit, Mango Pulp is perfectly suited for conversion to juices, nectars, drinks, jams and fruit cheese or to be had by itself or with cream as a superb dessert. It can also be used in puddings, bakery fillings, fruit meals for children and flavors for food industry, and also to make the most delicious ice creams, yoghurt and confectionery. The exotic aroma of the product makes it suitable for blending with mango pulp of other varieties.

Table 2.3 Product description of Alphanso mango pulp

T.S.S. (Degree Brix)	Min. 16	
Acidity (% as C.A.)	Aseptic & Frozen	Canned
anhydrous w/w	Max. 0.90%	Max. 0.90 %
pH	3.6 to 4.0	
	Aseptic & Frozen	Canned
Viscosity(Brookfield)	Min. 2200 cps at 20 degree C 16 degree Brix	Min. 2500 cps at 20 degree C 16 degree Brix
	Aseptic & Canned	Frozen
Total plate count	Max. 50/GM	Max. 5000/GM
Yeast and Mould	Max. 50/GM	Max. 1000/GM
E.coli	Nil	Nil

2.4.5.3 Microbiological Status

Alphanso Mango Pulp is free from any pathogenic bacteria. Aseptic and canned product is commercially sterile.

2.4.5.4 Storage Recommendations

Alphanso Mango Pulp should be stored at ambient temperature preferably below 25 degree Celsius and not below 4 degree Celsius. Higher temperature and sunlight should be avoided to enhance shelf life. Frozen product should always be stored at temperature less than -18 degree Celsius.

2.4.6 Totapari mango pulp

Totapari Mango pulp is made from selected variety of Totapari Mango. Fully matured Totapari Mangoes are harvested, swiftly transported to processing units, where they are inspected, washed, blanched, pulped, deseeded and processed. Totapari mango pulp is liquid gold in color.

Hygienically processed totapari mango pulp are easy to handle and it can be used in indefinite applications such as drinks, lassi, milkshake, fruit breads, cakes, tarts, ice-creams, fruit bars, toppings, deserts and in various exotic recipes. Totapari Mango pulp contains nutrients, such as vitamins A, E, C, & B5, which are considered necessary for glowing skin. Its antioxidant enzymes provide nourishment to body and helps fight serious diseases. Its Ayurvedic medicinal ingredients are used in many medicines. Aseptic totapari mango pulp is packed under strict supervision.

Table 2.4 Product description of Totapari mango pulp

PARAMETERS	VALUE
Total Soluble Solids % TSS at 20°C	14.0 °Brix min
Acidity (as citric acid)	0.40 - 0.6 %
Ph	3.5 to 4.5 %
Color	Bright Yellow
Taste	Wholesome & characteristic
Appearance	Natural Color pulp passed through 1/32” Mesh Sieve size
Flavor	Sweet and tart very remotely Comparable with fruit. Typical of freshly extracted Puree from well-ripened. Fruit free from cooked flavor and off-flavor of any kind.
Packaging	Product is packed in Aseptic Bag in Drum using a polyliner.
Net Weight	215 kg and 3.1 Kg packaging
Laudability	80 Drums Per 20’ FCL 3.1Kg L: - 6X3.1Kg/Cartron.
Storage Condition	Store at Ambient Temperature.
Shelf Life & Storage	Best before 12 months from the date of manufacture

III. METHODOLOGY

3.1 Research Methodology

3.1.1 Nature of Data

❖ Primary data

Through personal interview of mango producing farmers who were having 100 numbers of mango trees or more than 100 numbers of trees in orchard; APMCs and mango processing units of Gujarat.

❖ Secondary data

From published Govt. and Non Govt. reports and websites.

3.1.2 Research Instrument

Three different type of questionnaire were used for farmers, APMCs and process industry (Annexure – 4, 5 & 6 for farmers).

3.1.3 Sampling area

Junagadh, Navasari and Valsad.

3.1.4 Sampling techniques

Convenient sampling technique was used for data collection.

3.1.5 Sampling Unit

Farmers having 100 numbers of mango trees or more than 100 numbers of trees in orchard; APMCs and industry.

3.1.6 Sample Size

Junagadh: 74Farmers and 2 APMCs.

Navasari: 52 Farmers and 1APMCs.

Valsad: 62 Farmers and 3 APMCs.

4 processing industry in Gujarat.

3.1.7 Data analysis method

After compiling, the data were analyzed by graphical and tabular method.

3.2 Limitations of the study

- ❖ This project requires primary survey of the farmers; APMCs mandi and foods processing industry which is time consuming and project period is limited. So time constrain is the major limitation of this project.
- ❖ The data obtained through secondary research may be outdated.
- ❖ Sample taken from given area may not represent the whole availability of raw mango.
- ❖ Small sample size may not be true representative of the whole information.
- ❖ Convenience sampling method was used in this survey.
- ❖ Respondents may be biased.

IV. RESULTS AND DISCUSSION

4.1 Production of mango in Gujarat state

Table 4.1 District Wise Area & Production of mango in Gujarat in 2008-09

Sr. no.	Name of district	Area (ha)	Production (MT)
1	Ahmadabad	185	333
2	Amelia	6147	18441
3	Banaskantha	485	1213
4	Bharuch	2750	5500
5	Narmada	2860	4290
6	Bhavnagar	5520	33120
7	Dang	2770	8310
8	Gandhinagar	967	2418
9	Jamnagar	429	1454
10	Junagadh	16880	54016
11	Porbandar	195	800
12	Kutch	7304	25564
13	Kheda	800	800
14	Anand	2300	3450
15	Mehsana	805	1610
16	Patan	63	126
17	Panchmahal	2150	4300
18	Dahod	2235	3352
19	Rajkot	360	1440
20	Sabarkantha	3078	8618
21	Surat	6290	9435
22	Surendranagar	569	2512
23	Baroda	5450	10900
24	Valsad	24240	48480
25	Navsari	18048	45120
26	Tapi	2810	4215
	Total	115690	299817

Source: National Horticulture Board (2008-09)

Junagadh, Navasari and Valsad district farmers produce mango for commercial purpose for local & international market. These three districts collectively contribute about 50% of total mango production in Gujarat state. In this state mango is cultivated in 115690 hectares of land with average annual production of about 299817 MT.

4.1.1. Production overview

4.1.1.1 Junagadh

Table 4.2 Area, production and productivity of mango in Junagadh District in 2008-09.

S. No.	Taluka	Area (ha.)	Production (MT.)	Productivity (MT/ha.)
1	Junagadh	515	1648	3.2
2	Visavadar	820	2624	3.2
3	Bhensan	110	352	3.2
4	Menderada	1220	3904	3.2
5	Keshod	210	672	3.2
6	Mangrol	200	640	3.2
7	Manavadar	100	320	3.2
8	Vanthali	2040	6528	3.2
9	Veraval	510	1632	3.2
10	Maliya	1710	5472	3.2
11	Sutrapada	105	336	3.2
12	Talala	5620	17984	3.2
13	Kodinar	670	2144	3.2
14	Una	3050	9760	3.2
	Total	16880	54016	3.2

Source: Agriculture department Zilla parishad, Junagadh 2008-09

In Junagadh district mango cultivation is done in 16880 Ha land with an annual production of 54016 MT and Junagadh contributes 18.1% in terms of mango production in Gujarat state. In terms of area of mango, Talala taluka with 5620 Ha contribution stands first. Una, Vanthli and Menderada cover respectively 3050, 2040 and 1220 Ha. In production point of view again Talala is highest producer(17984MT) in Junagadh district. Una, Vanthli and Menderada produce respectively 9760, 6528 and 3904 MT.



Fig 4.1(a): Mango farm in Veraval



Fig 4.1(b): Mango farm in Veraval



Fig. 4.2 Keshar Mango farm in vanthali, Junagadh



Fig 4.3 APMCs market in Tatala taluka, Junagadh



Fig 4.4 Keshar mango

4.1.1.2 Navasari

Table 4.3 Area, production and productivity of mango in Navasari District

Sr. No.	Taluka	Area (ha.)	Production (MT.)	Productivity (MT/ha.)
1	Navasari	3470	8675	2.5
2	Jalalpore	1930	4825	2.5
3	Gandevi	4070	10175	2.5
4	Chikhali	7048	17620	2.49
5	Vansada	1530	3825	2.5
	Total	18048	45120	2.5

Source: Navasari agricultural University, Navasari 2008-09

In Navasari district mango cultivation is done in 18048 Ha land with an annual production of 45120 MT and the district contributes 15% in terms of mango production in Gujarat state. In terms of area of mango Chikhali taluka with 7048 Ha under mango cultivation stands first. Gandevi, Navasari and Jalalpoore cover respectively 4070, 3470 and 1930 Ha for mango production. In production point of view again Chikhali is highest producer (17620MT) in navasari district. Gandevi, Navasari and Jalalpore produce respectively 10175, 8675 and 4825 MT.



Fig 4.5 Alphonso mango farm in Navasari

ધો એગ્રીકલ્ચરલ પ્રોડયુસ માર્કેટ કમીટી,
બોલીમોરા...
અમલસાડ - સબચાર્ડ ...
-૬ ભાવ પ્રસીદ્ધ બોર્ડ -૬

“૨૦” કિલો નો ભાવ તા. ૧૬/૦૫/૨૦૨૦
જાણી નામ, ભાવ, આવડ ...

(૧) ચોક્કુ નં- ૧
(૨) ચોક્કુ નં- ૨

કેરી

ક્રમ	ભાવ	ક્રમ	નામ	ભાવ
૧	દાંડી	૧૫	મુંબઈ ગરો	
૨	કાંચડા	૧૬	ભારતીય	
૩	કેરી	૧૭	મકારામ	
૪	ચુલ્લુ પુરી	૧૮	મલગાબો	
૫	ટાટા પુરી	૧૯	ફરી	
૬	સરદાર	૨૦	ફેસ	
૭	દાંડી	૨૧	મોરબદામ	
૮	કચ્છીયા	૨૨	ફેશી	
૯	દાંડી	૨૩		
૧૦	નોલમે	૨૪		
૧૧	જાદાદ	૨૫		
૧૨	બદામી	૨૬		
૧૩	પાનસા	૨૭		
૧૪	મલગાબો	૨૮		

Fig. 4.6 APMCs market in Amalsad, Navasari



Fig. No. 4.7: Packing of mango



Fig. No. 4.8 Raja puri mango

4.1.1.3 Valsad

Table 4.4 Area, production and productivity of mango in Valsad District

Sr. No.	Taluka	Area (ha.)	Production (MT.)	Productivity (MT/ha.)
1	Valsad	8935	85736	9.59
2	Pardi	6570	63072	9.6
3	Kaprada	2675	25145	9.4
4	Umargoan	2650	25175	9.5
5	Dharmpur	2750	25850	9.4
	Total	23580	224978	9.54

Source: Navasari agricultural University, Navasari 2008-09

In Valsad district mango cultivation is done in 23580 Ha land with an annual production of 224978 MT and Valsad contributes 16% in terms of mango production in Gujarat state. In terms of area under mango cultivation, Valsad taluka with 8935 Ha contribution stands first. Pardi and Dharmpur cover respectively 6570 and 2750 Ha. In production point of view again Valsad is highest producer area(85736 MT) in Valsad district. Pardi and Dharmpur produce respectively 63072 and 25850 MT of mango.



Fig 4.9 Inter cropping in mango crop



Fig. No. 4.10: Mango farm in Dharmpur

4.2 Mango pulp processing

Mango Pulp is prepared from selected varieties of Fresh Mango Fruit. Fully matured Mangoes are harvest, quickly transported to the fruit processing plant, inspected and washed. Selected high quality fruits go to the controlled ripening chambers; Fully Ripened Mango fruits are then washed, blanched, pulped, deseeded, centrifuged, homogenized, concentrated when required, thermally processed and aseptically filled maintaining sterility.

4.2.1 Varieties

Main varieties of Mango Pulp are Alphanso Mango Pulp, Totapari Mango Pulp, and Keshar Mango Pulp.

4.2.2 Areas of Cultivation and Processing

Two main clusters of Mango Pulp are there in the country, which has around 65 processing units with a good backward linkage of Alphanso and Totapari variety of mangoes. These clusters are Chittoor in the state of Andhra Pradesh and Krishnagiri in the state of Tamil Nadu. Some of the Processing units are in the state of Maharashtra and Gujarat. Mango Pulp/Concentrate may be used for reconstitution of nectar, drinks juices and various other kinds of beverages. In addition it can be used in preparing ice-creams, yoghurt and confectionery.

4.2.3 Mango Pulp Processing Method

The preparation process includes cutting, de-stoning, refining and packing. In case of aseptic product the pulp is sterilized and packed in aseptic bags. The refined pulp is also packed in OTS cans, hermetically sealed and retorted.

Frozen pulp is pasteurized and deep-frozen in plate freezers. The process ensures that the natural flavor and aroma of the fruit is retained in the final product under Good Hygienic Condition.

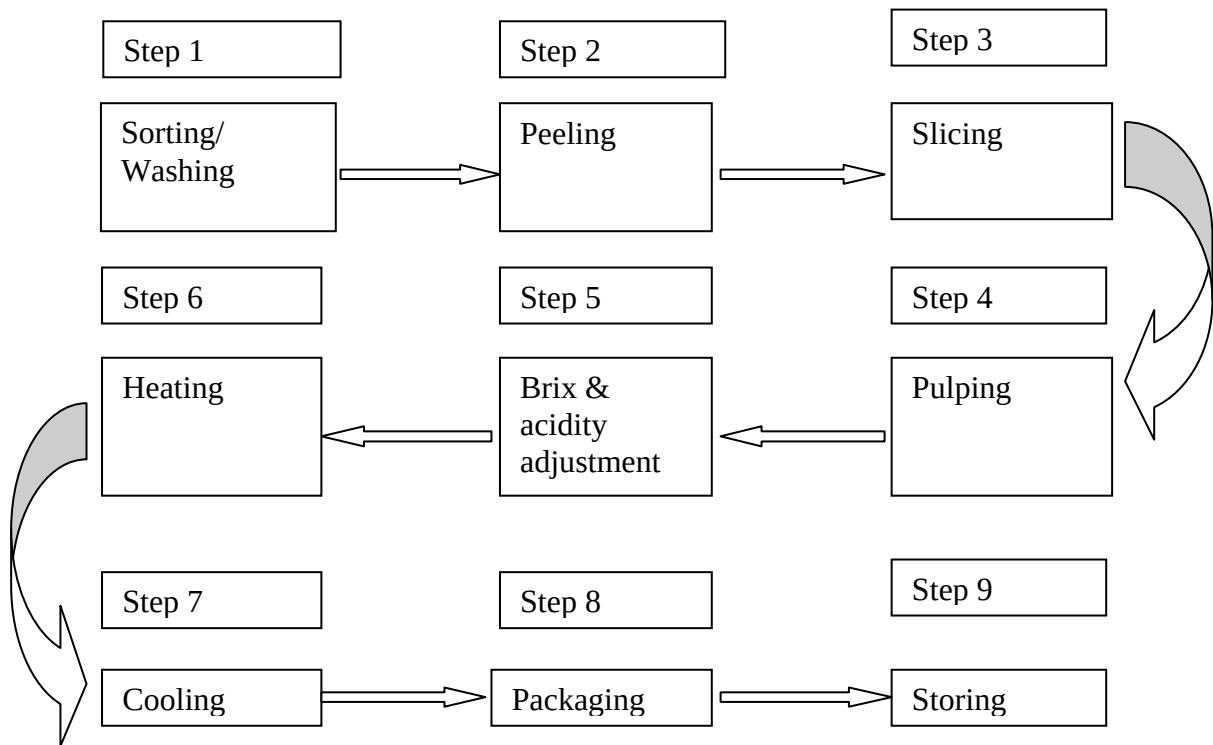


Fig 4.11 Mango Pulp Processing Method

Production process involves washing, peeling, slicing, pulp extraction, acidity adjustment, heating, cooling, packaging, and storing.

- The first process in production is that of washing the exteriors of the mangoes and sorting them in accordance to the quality i.e. the grafted mangoes are differentiated from the totapari variety as they have to be further mixed in a certain ratio.
- After the point where the soft middle core comes into the picture all the proceeding processes are handled by the machine. This is so

that the quality norms are maintained and the middle core is not touched by hand. Therefore the peeling process of separating the skin from the soft middle core is machine oriented.

- The process of cutting where the soft middle core is separated from the hard seed is also machine oriented.
- Pulping is method of liquefying the soft middle core which is carried out by a machine much like the squeezer.
- The sugar content in the pulp is maintained by implementing the brix scale and emulsifying agents are added, sugar and citric acid act like natural preservatives. The Ph balance i.e. The acidity is also calculated and maintained within a range of 3.8 – 4.1 at 20 C.
- Heating of pulp up to 88 C – 90 C in steam jacketed kettle eliminates all the micro organisms present in freshly extracted mango pulp.
- The freezing point of mango is 1.1 C but a chilling injury occurs at when cooled less than 13 C.
- The pulp is then packed in aseptic packs in a vacuum of negative pressure (min. 6*) so that there are no air bubbles left reducing the exposure to rotting.
- Finally the storage is done at temperatures within the range 13 C– 15 C as below 13 C it causes chilling injury to the pulp.

4.3 Product segmentation

4.3.1 Usages

Farm Fresh Fruit purees are easy to handle and can be used in unlimited applications.

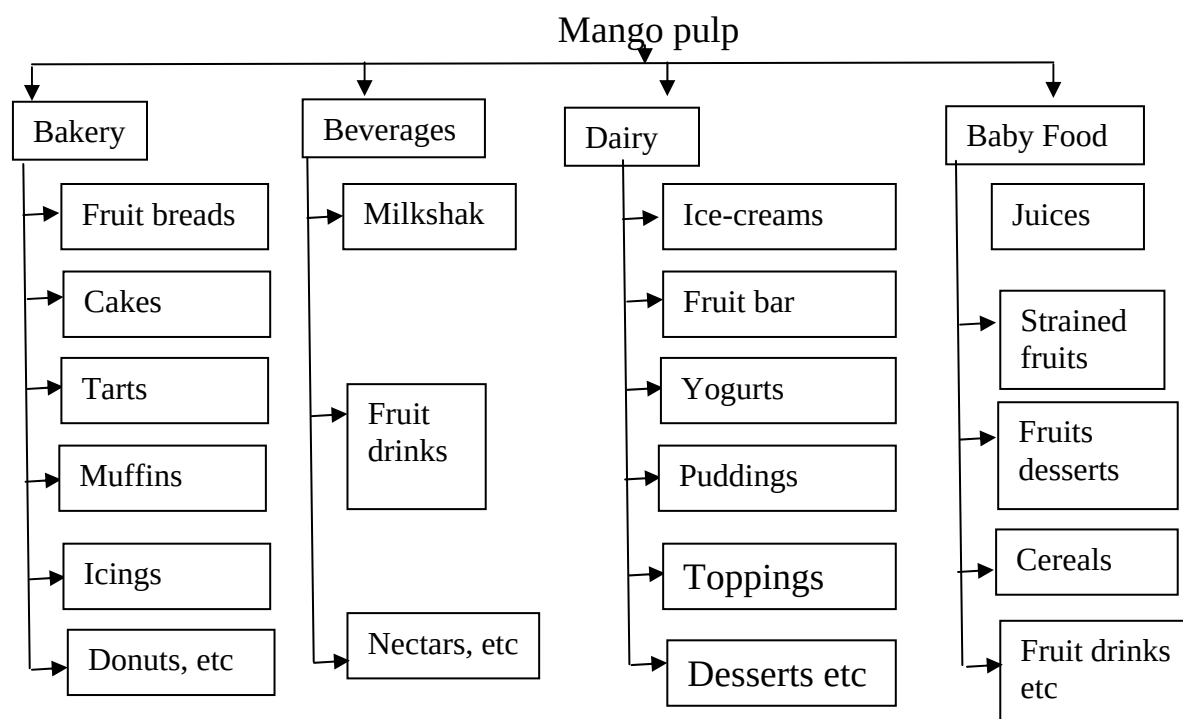


Fig 4.12 Usages of mango pulp

4.3.2 Mango Concentrate, Mango Pulp & Mango Puree

These are made from selected varieties of Mango. Fully matured Mangoes are harvested, quickly transported to our fruit processing plant, inspected and washed. Selected high quality fruits go to the controlled ripening chambers; Fully Ripened Mango fruits are then washed, blanched, pulped, deseeded, centrifuged, homogenized, concentrated when required, thermally processed and aseptically filled maintaining commercial sterility.

4.4 Finding the most efficient channel

The present study attempt to examine the most efficient channel of mango from the farmer to process industry in term of handling, packaging, marketing margin and price spread for mango in Junagadh, Valsad and Navasari district of Gujarat in India.

Channel I:-



Channel II:-

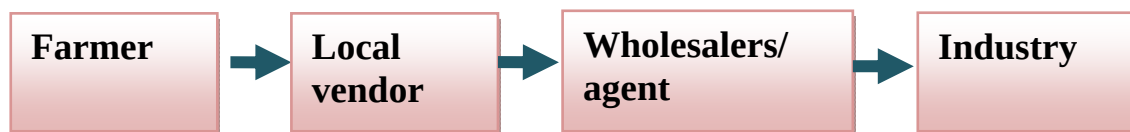


Fig 4.13 Market Channel of Mango Distribution

4.4.1 Tools of analysis

1:- Conventional analysis like simple averages and percentages were used.

2:- Price spread calculated using the formula:

$$\text{Price spread} = \text{industrial price} - \text{producer price}$$

3:- The economic efficiency of market was calculated with shepherd's formula:

$ME = V/I$, Where ME = index of market efficiency, V= value of goods sold or paid by the industry, I= total market cost+ margin

4.4.2 Junagadh district

In Junagadh market, two channels prevail in marketing of mango, here named as Junagadh Channel I (J-C-I), Junagadh Channel II (J-C-II).

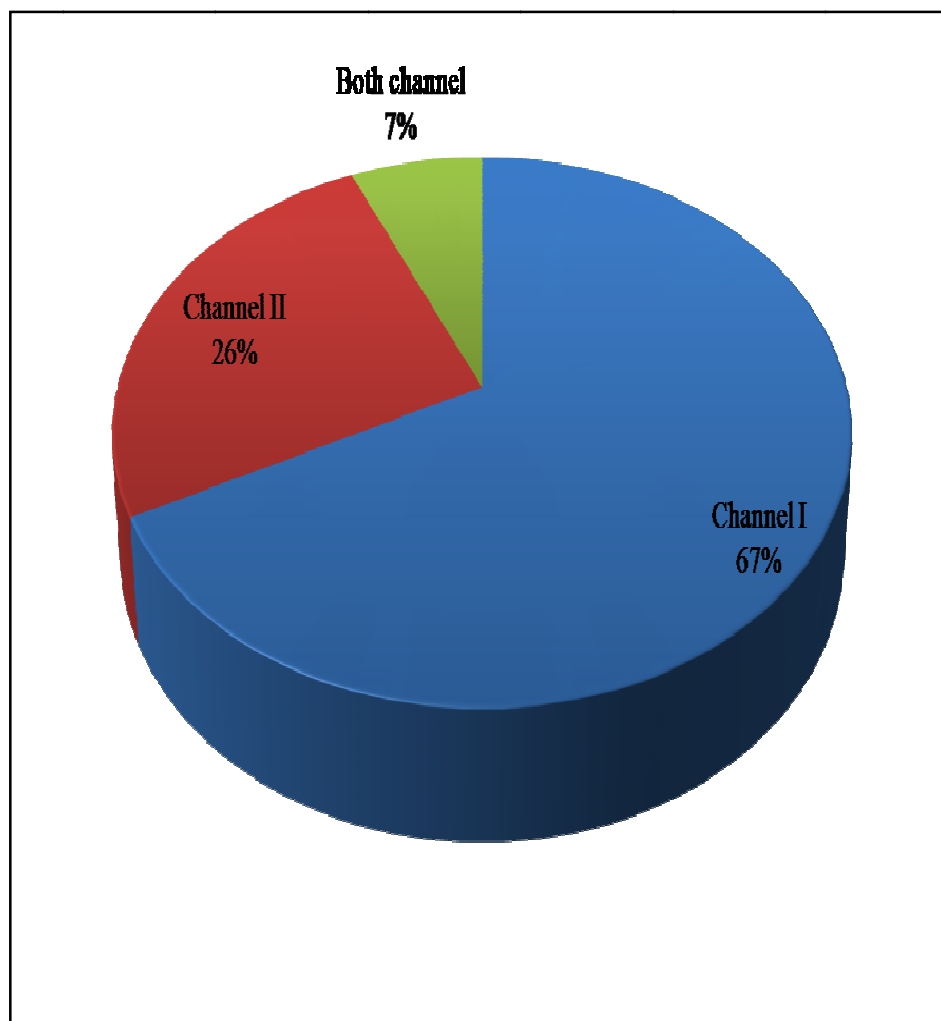


Fig. 4.14:- Channel preference by farmers in Junagadh district

In Junagadh, about 67% are using channel I, 26% of farmers are using channel II and rest of them using both channel.

4.4.2.1 Junagadh market Channel I (J-C-I)

Table 4.5 Price spread of mango for Junagadh market channel I (Rs./10 kg)

Particular (Rs/ box)	Keshar	
	Cost	Percent
<u>Farmers</u>		
Gross price received	260	83.06
Packaging	25	7.99
Transportation	5	1.6
Weighing	0	
Loading & unloading	5	1.6
Storages	0	
Commission	26	8.31
Others	5	1.6
Total marketing cost	66	21.08
Net price received	194	61.99
<u>Wholesaler / agent</u>		
Purchase price	260	83.06
Transportation	8	2.55
Weighing	0	0
Loading & unloading	10	3.2
Storage	0	0
Other	20	6.39
Total marketing cost	38	12.14
Margin/ commission	15	4.79
Sale price	313	100
Industry	313	100
Price spread	119	

The price spread was calculated for one major variety viz. keshar. The average gross price received by the producer was Rs. 260 per box of 10 kg of keshar mango. The net price received was Rs. 194. The average price paid by the industry for keshar mango was Rs.313.

4.4.2.2 Junagadh market Channel II (J-C-II)

Table 4.6 Price spread of mango for Junagadh market channel II (Rs./10 kg)

Particular (Rs. /box)	Keshar	
	Cost	Percent
<u>Farmer</u>		
Net price received	230	62
<u>Local vender</u>		
Purchase price	230	62
Packaging	20	5.4
Transportation	5	1.34
Loading/ unloading	5	1.34
Weighing	0	
Storage	0	
Margin/ commission	23	6.12
Other	10	2.70
Marketing cost	63	17.00
Margin of local vender	20	5.40
Sale price	313	84.37
<u>Wholesaler/ agent</u>		
Purchase price	313	84.37
Transportation	8	2.16
Weighing	0	
Loading & unloading	10	2.70
Storage	0	
Other	20	5.40
Total marketing cost	38	8.09
Margin/ commission	20	5.40
Sales price	371	100
Industry	371	100
Price spread	141	

The above table indicates that net price received by producer was 230 Rs./ box of 10 kg of keshar mango. The average price paid by industry for keshar mango was Rs. 371 per box of 10 kg.

4.4.3 Navasari district

In Navasari market, three channels prevailed in marketing of mango, named as Navasari Channel I (N-C-I) & Navasari Channel II (N-C-II).

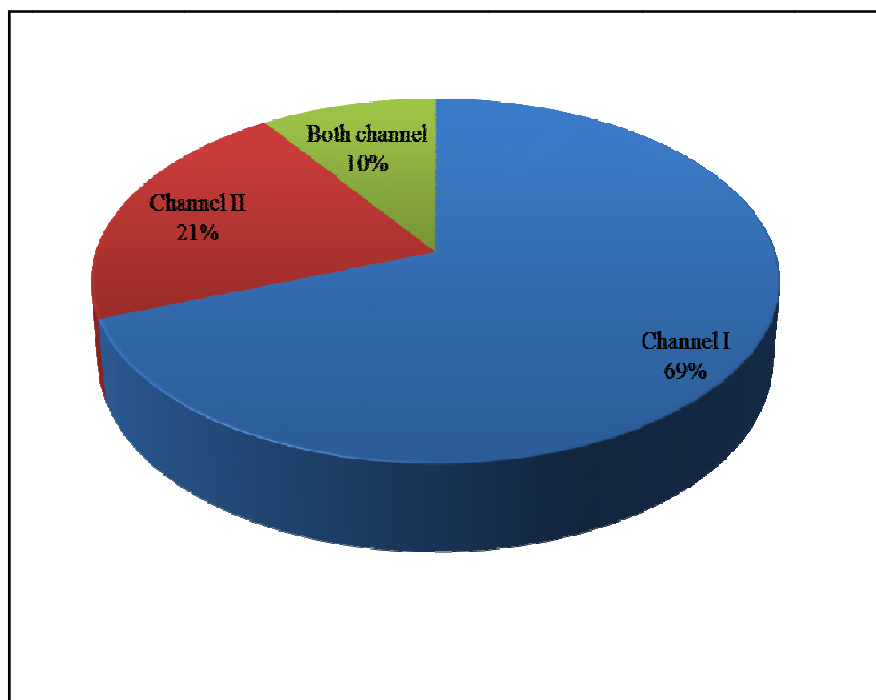


Fig 4.15:- Channel preference by farmers in Navasari

In Navasari, about 69% farmers are using channel I, 21% of farmers are using channel II and rest of them using both the channels.

4.4.3.1 Navasari channel- I (N-C-I)

Table 4.7 Price spread of mango for Navasari market channel I (Rs. /20 kg)

Particular (Rs. /20 kg.)	Keshar		Alphonso		Rajapuri		Desahari	
	Cost	%	Cost	%	Cost	%	Cost	%
<u>Farmer</u>								
Gross price received	600	90.22	700	90.32	500	80.23	600	90.22
Transportation	20	3.00	20	2.58	20	3.57	20	3.00
Weighing	0		0		0		0	
Loading/unloading	5	0.76	5	0.65	5	0.89	5	0.76
Storage	0		0		0		0	
Commission/margin	60	9.02	70	9.03	50	8.93	60	9.02
other	15	2.26	15	1.94	15	2.68	15	2.26
Total marketing cost	100	15.03	110	14.19	90	16.07	100	15.03
Net price received	500	75.19	590	76.13	410	73.21	500	75.19
<u>Wholesaler/agent</u>								
Purchase price	600	90.22	700	90.32	500	80.23	600	90.22
Transportation	15	2.26	15	1.94	15	2.68	15	2.26
Weighing	0		0		0		0	
Loading/unloading	10	1.50	10	1.23	10	1.79	10	1.50
Storage	0		0		0		0	
Other	10	1.50	10	1.23	10	1.79	10	1.50
Marketing cost	35	5.26	35	4.51	35	6.25	35	5.26
Margin	30	4.51	40	5.16	25	4.46	30	4.51
Sell price	665	100	775	100	560	100	665	100
Industry price	665	100	775	100	560	100	665	100
Price spread	165		185		150		165	

It could be seen from the table that average gross price received by the producer was Rs. 600 per 20 kg. of keshar variety of mango. And the same for alphanso, Rajapuri and Desahari were Rs. 700, Rs. 500 and Rs. 600 respectively. The average price paid by the consumers for keshar was Rs. 665 per 20 kg. And the same for alphanso, Rajapuri and Desahari were Rs. 775, 560 and 665 per 20 Kg.

4.4.3.2 Navasari Channel II (N-C-II)

Table 4.8 Price spread of mango for Navasari market Channel II (Rs./20 kg)

Particular (Rs. /20 kg.)	Keshar		Alphanso		Rajapuri		Desahari	
	Cost	%	Cost	%	Cost	%	Cost	%
<u>Farmer</u> Net price received	550	72.37	650	73.86	450	70.87	550	72.37
<u>Local vender</u> Purchase price	550	72.37	650	73.86	450	70.87	550	72.37
Transportation	20	2.63	20	2.27	20	3.14	20	2.63
Weighing	0		0		0		0	
Loading/ unloading	10	1.32	10	1.14	10	1.57	10	1.32
Storage	0		0		0		0	
commission	55	7.24	65	7.39	45	7.09	55	7.24
Other	10	1.32	10	1.14	10	1.57	10	1.32
Total marketing cost	95	12.50	105	11.93	85	13.39	95	12.50
Margin of local vender	40	5.26	45	5.11	30	4.72	40	5.26
Sale price	685	90.13	800	90.91	565	88.82	685	90.13
<u>Wholesaler/ agent</u> Purchase price								
Transportation	685	90.13	800	90.91	565	88.82	685	90.13
Weighing	15	1.97	15	1.70	15	2.36	15	1.97
Loading/ unloading	0		0		0		0	
Storage	15	1.97	15	1.70	15	2.36	15	1.97
Other	0		0		0		0	
	15	1.97	15	1.70	15	2.36	15	1.97
Marketing cost	45	5.92	45	5.11	45	7.09	45	5.92
Margin	30	3.95	35	3.98	25	3.94	30	3.95
Sale price	760	100	880	100	635	100	760	100
Industry price	760	100	880	100	635	100	760	100
Price spread	210		230		185		210	

It could be seen from the table that average net price received by the producer was Rs. 550 per 20 kg. of keshar variety of mango. And the same for alphanso, Rajapuri and Desahari were Rs. 650, Rs. 450 and Rs. 550 respectively. The average price paid by the consumers for keshar was Rs. 760 per 20 kg. And the same for alphanso, Rajapuri and Desahari were Rs., 880, 635 and 760 per 20 Kg.

4.4.4 Valsad

In Navasari market, three channels prevailed in marketing of mango, and name as Valsad Channel I (V-C-I), Valsad Channel II (V-C-II).

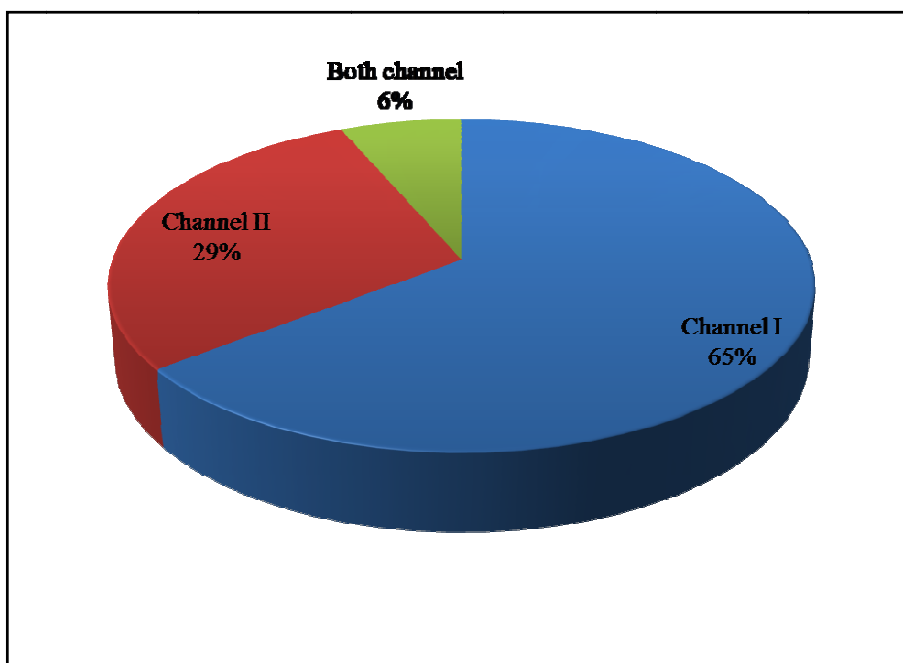


Fig 4.16 Channel preference by farmers in Valsad district

In Valsad, about 65% farmers are using channel I, 29% of farmers are using channel II and rest of them using both the channels.

4.4.4.1 Valsad Channel I (V-C-I)

Table 4.9 Price spread of mango for Valsad market channel I (Rs. / 20 kg)

Particular (Rs. /20 kg.)	Keshar		Alphanso		Rajapuri		Desahari	
	Cost	%	Cost	%	Cost	%	Cost	%
<u>Farmer</u>								
Gross price received	600	90.22	700	90.32	500	80.23	600	90.22
Transportation	20	3.00	20	2.58	20	3.57	20	3.00
Weighing	0		0		0		0	
Loading/unloading	5	0.76	5	0.65	5	0.89	5	0.76
Storage	0		0		0		0	
Commission/margin	60	9.02	70	9.03	50	8.93	60	9.02
other	15	2.26	15	1.94	15	2.68	15	2.26
Total marketing cost	100	15.03	110	14.19	90	16.07	100	15.03
Net price received	500	75.19	590	76.13	410	73.21	500	75.19
<u>Wholesaler/ agent</u>								
Purchase price								
Transportation	600	90.22	700	90.32	500	80.23	600	90.22
Weighing	15	2.26	15	1.94	15	2.68	15	2.26
Loading/unloading	0		0		0		0	
Storage	10	1.50	10	1.23	10	1.79	10	1.50
Other	0		0		0		0	
	10	1.50	10	1.23	10	1.79	10	1.50
Marketing cost	35	5.26	35	4.51	35	6.25	35	5.26
Margin	30	4.51	40	5.15	25	4.46	30	4.51
Sell price	665	100	775	100	560	100	665	100
Industry price	665	100	775	100	560	100	665	100
Price spread	165		185		150		165	

It could be seen from the table that average gross price received by the producer was Rs. 600 per 20 kg. of keshar variety of mango. And the same for alphanso, Rajapuri and Desahari were Rs. 700, Rs. 500 and Rs. 600 respectively. The average price paid by the consumers for keshar was Rs. 665 per 20 kg. And the same for alphanso, Rajapuri and Desahari were Rs. 775, 560 and 665 per 20 Kg.

4.4.4.2 Valsad Channel II (V-C-II)

Table 4.10 Price spread of mango for Valsad market channel I (Rs. / 20 kg)

Particular (Rs. /20 kg.)	Keshar		Alphonso		Rajapuri		Desahari	
	Cost	%	Cost	%	Cost	%	Cost	%
<u>Farmer</u>								
Net price received	550	72.37	650	73.86	450	70.87	550	72.37
<u>Local vender</u>								
Purchase price	550	72.37	650	73.86	450	70.87	550	72.37
Transportation	20	2.63	20	2.27	20	3.14	20	2.63
Weighing	0		0		0		0	
Loading/ unloading	10	1.32	10	1.14	10	1.57	10	1.32
Storage								
commission	0		0		0		0	
Other	55	7.24	65	7.39	45	7.09	55	7.24
	10	1.32	10	1.14	10	1.57	10	1.32
Total marketing cost	95	12.50	105	11.93	85	13.39	95	12.50
Margin of local vendor	40	5.26	45	5.11	30	4.72	40	5.26
Sale price	685	90.13	800	90.91	565	88.82	685	90.13
<u>Wholesaler/ agent</u>								
Purchase price								
Transportation	685	90.13	800	90.91	565	88.82	685	90.13
Weighing	15	1.97	15	1.70	15	2.36	15	1.97
Loading/ unloading	0		0		0		0	
Storage	15	1.97	15	1.70	15	2.36	15	1.97
Other								
	0		0		0		0	
	15	1.97	15	1.70	15	2.36	15	1.97
Marketing cost	45	5.92	45	5.11	45	7.09	45	5.92
Margin	30	3.95	35	3.98	25	3.94	30	3.95
Sale price	760	100	880	100	635	100	760	100
Industry price	760	100	880	100	635	100	760	100
Price spread	210		230		185		210	

It could be seen from the table that average net price received by the producer was Rs. 550 per 20 kg. of keshar variety of mango. And the same for alphanso, Rajapuri and Desahari were Rs. 650, Rs. 450 and Rs. 550 respectively. The average price paid by the consumers for keshar was Rs. 760 per 20 kg. And the same for alphanso, Rajapuri and Desahari were Rs. 880, 635 and 760 per 20 Kg.

4.4.5 Marketing cost incurred in different channels of mango

Table 4.11 Marketing cost of intermediaries in selected marketing channel

Particulars	Junagadh		Navasari and Valsad (Rs./ 20 kg)							
	Keshar (Rs/10 kg box)		Keshar		Alphanso		Rajapuri		Desahari	
	CH I	CH II	CH I	CH II	CH I	CH II	CH I	CH II	CH I	CH II
Cost incurred by producer	66	-	100	-	110	-	90	-	100	-
Cost incurred by local vendor	-	63	-	95	-	105	-	85	-	95
Cost incurred by wholesaler/ agent	38	38	35	45	35	45	35	45	35	45
Total	104	101	135	140	145	150	125	130	135	140

The marketing cost in channel I of Junagadh district was Rs.104 for keshar variety. The same in channel II was Rs. 101 per box of 10 kg. In Navasari and Valsad market, it was highest for channel I for alphanso with Rs. 145 followed by Keshar, Desahari and Rajapuri with Rs. 135, Rs. 135 and Rs. 125 respectively per 20 kg.

4.4. Marketing margin of intermediaries of mango

Table 4.12 Marketing margin of Intermediaries in selected market channel

Particulars	Junagadh		Navasari and Valsad (Rs./ 20 kg)							
	Keshar (Rs/10 kg box)		Keshar		Alphanso		Rajapuri		Desahari	
	CH I	CH II	CH I	CH II	CH I	CH II	CH I	CH II	CH I	CH II
Margin of wholesaler/ agent	15	20	30	30	40	35	25	25	30	30
For local vendor	0	20	0	40	0	45	0	30	0	40
Total	15	40	30	70	40	80	25	55	30	70

The market margin of the intermediaries was found to be Rs. 15 for Keshar in Junagadh Channel I. And the same in channel II with Rs. 40 per 10 kg box. In Navasari and Valsad, it was highest for channel I of alphanso with Rs.40 followed by Keshar, Desahari and Rajapuri with Rs. 30, Rs. 30 and Rs. 25. And for the same in channel II, it was highest for Alphanso with Rs. 80 followed by Keshar, Desahari and Rajapuri with Rs. 70, Rs. 70 and Rs 55 respectively per 20 kg.

4.4.7 Marketing efficiency

Table 4.13 Market efficiency in selected marketing channel

Particulars	Junagadh		Navasari and Valsad (Rs./ 20 kg)							
	Keshar (Rs/10 kg box)		Keshar		alphanso		Rajapuri		Desahari	
	CH I	CH II	CH I	CH II	CH I	CH II	CH I	CH II	CH I	CH II
Value for goods sold (industry price)	313	371	665	760	775	880	560	635	665	760
Total marketing cost (i)	104	101	135	140	145	150	125	130	135	140
Total market margin (ii)	15	40	30	70	40	80	25	55	30	70
TMC + TMM (i+ii)	119	141	165	210	185	230	150	185	165	210
Index of marketing efficiency	2.63	2.62	4.03	3.62	4.19	3.82	3.75	3.43	4.03	3.62

In Junagadh, for Keshar variety the efficiency was more for channel I (2. 63) as compared to channel II (2.62). Similarly, for Navsari & Valsad, for all the four varieties under study viz. Keshar, Alphanso, Rajapuri & Desahari channel I was more efficient.

4.5 Regulatory requirement and intervention for Food Processing Industry.

4.5.1 Agri. Business registration process

PROJECT INFORMATION:

1:- Name & address of industrial undertaking in full (Please fill in block letters)

Name of Undertaking:

Area

Town/City

District

Taluka

State

Pin Code

Phone: STD Code

Numbers

Fax: STD Code

Numbers

Telex:

Cable:

E-Mail

Web Site:

2 Local office (contact person) (Please fill in block letters)

Name:

Address:

Phone: STD Code

Numbers

Fax: STD Code

Numbers

Telex:

Cable:

E-Mail

3 S.S.I. IEM LOI EOU (please tick mark)

Registration No.:

Date: / /

4 Period up to which the registration is valid

Date: / /

**5 Registration number allotted by registrar of companies
(If Registered)**

Registration No.:

6 Details of the directors/ MD (Please fill in block letter).

Name:

Designation:

Street/ Area

Town/ City

Tehsil/ Taluka

District

State

Pin Code

Phone: STD Code

Numbers

Fax: STD Code

Numbers

E-Mail:

7 Location of the project

Site/ Survey No.

Village:

Tehsil / Taluka:

District

Pin Code:

8 Status of promoter/ industrial undertaking (Please tick mark)

() Central Govt. Undertaking () Private Sector Undertaking

() State Govt. Undertaking () FDI / OCB

() Co-operative Undertaking () NRI

() Joint Sector Undertaking () Partnership Firm

() Assisted Sector Undertaking () Individual Promoter

9 Indicate whether this proposal is for (Please tick mark):

- () Establishment of new undertaking
- () Effecting substantial expansion
- () Effecting diversification
- () Effecting modernization
- () Others, please specify: _____

10 Purpose for expansion/ modernization/ diversification:

11 Items of manufacture/ production/ processing:

Table 4.14 Items of manufacture/ production/ processing

Sr. No.	Name of Product	Item Code	Installed Capacity (Annual)	Unit	Value (Rs.)	Mode of Storage & Handling

12 Requirements of raw materials (Product-wise):

Table.4.15 Requirements of raw materials (Product-wise)

Sr. No.	Name of Product	Name of Raw material	Yearly requirement (In Qtl.)	Yearly req.(in Value)	indigenous	Mode of Storage & Handling

13 Details of plant & machinery

Table 4.16 Details of plant & machinery

Sr. No.	Name of the machinery	No.	Value Rs. (in lacs)	Horse Power	Dimension & floor space Req. (in Sq. Mtrs.)

14 Details of manufacturing/ processing/ producing

(Please attach a short note on separate sheet and give reference here)

15 Whether the proposed project is availing assistance from NHB/ MFPI / APEDA

YES / NO. (If yes, please give details)

Year of establishment of the applicant.

Are you seeking registration as

- Manufacturer. / Processor.
- Manufacturer - Exporter.
- Merchant - Exporter.
- R. & D. Institute.
- Farmer Exporter.
- Agri infrastructure project.
- Consultant.
- Any others (Please Specify)

16 Turn - over in Agri business value of last 3 years.

Table 4.17 Turn - over in Agri business value of last 3 years.

No.	Year	Turn- over		Total
		Domestic	Export	
1				
2				

17 Agribusiness registration fees

Turnover or project cost whichever is higher would be applicable.

Table 4.18 Agri business registration fees

Turnover/Project cost In Rs. Lacs	Registration Fees. (Rs.)
Up to 100	1000/-
101 to 500	2000/-
501 to 1000	5000/-
1001 to above	10,000/-

18 Details of payment.

Cheque No / D.D. No.

Bank

Branch

Amount Rs. _____.

I /We hereby declare that the above information is correct to the best of my/our Knowledge and belief. I/We also undertake to abide by the condition subject to which registration /Membership is granted.

Signature. _____

Name in block letters. _____

Designation: _____

Address: _____

Date: _____

Encl:

1. Copy of project Report with Project Cost.
2. D.D/cheque in Favor of Gujarat Agro. Industry Ltd., Ahmadabad.

4.5.2 Gujarat Industrial Policy (2003)

Gujarat Industrial Policy (2003) proposes the following changes in the mandi system:

- 1) Establishing linkage with multi-commodity exchange.
- 2) Strengthening future market for agri. Commodity.
- 3) The government would strive to create model APMC that would serve as a source of inspiration for other APMC's in the state.

4.5.3 Incentives:

- o The Government of Gujarat offers an attractive package of financial support and incentives for agro industrial projects to reputed companies with proven technical capability and track record to successfully conceive and implement agro industrial projects.
- o Incentive would be available to new Units as well as existing Units undertaking technology up-gradation, modernization, expansion or diversification. Incentives would be available in entire State except areas covered under jurisdiction of Municipal Corporation of Ahmadabad, Vadodara, Surat, Rajkot, Jamnagar and Bhavnagar. However, Cold Chain projects and Retail outlets for perishables will

be entitled for incentives in areas under jurisdiction of Municipal Corporations also.

4.5.4 Interest subsidy to agro industrial units

The State Government offers back ended interest subsidy to Tiny, Small, Medium and Large agro industrial units, as under:

1. 6% per annum back ended interest subsidy for first 5 years, from commencement of operations, and the aggregate interest subsidy will not exceed Rs.100 lacs.
2. The interest subsidy will be available on the funds borrowed from financial institutions/banks for capital investments only. No interest subsidy will be available towards working capital loan or any other loan, which is not in the nature of Term Loan meant for acquiring capital assets.
3. The interest subsidy will be released so long as the eligible unit continues timely repayment of the loan and remains in production.

4.5.4.1 Incentives / Subsidies available from National Institutions

Table 4.19 Schemes operated by Department of Food Processing Industries (FPI), under Ministry of Agriculture, GOI.

Scheme		Benefits
1.	For setting up / expansion/modernization of food processing industries has four components	It can be in the form of a grant and ranges from 25% of cost of capital equipment & technical civil works up to Rs.50 lacs.
1-1.	Setting up / expansion/modernization of food	50% of the cost of dryer and dust control system up-to Rs.5 lacs in all

	processing units.	areas, as grant.
1-2.	Modernization of pulse milling units.	50% of the project cost up to Rs.40 to 60 lacs as grant.
1-3.	Dissemination of low cost preservation technology	Actual cost of technology up to Rs.5 lacs as grant or loan depending upon the type of unit.
2.	Scheme for development / modernization of meat processing	50% of the cost of capital equipment & technical civil works up to Rs.75 lacs in general areas & 75% of cost up to Rs 100 lacs in difficult areas, as grant.
3.	Scheme for development of poultry and egg processing for both domestic and export markets.	50% of the cost of capital and technical civil works up to Rs.50-75 lacs in general areas and 75% of such cost up to 100 lacs in difficult areas as grant or loan.
4.	R&D in FPI. For undertaking specific R&D projects, Updating, processing, packing, storage technologies to meet international standardization of various factors, R&D work for better quality and packaging of milk products, development of value added products from non-conventional marine resources, setting up common Quality Control laboratory,	100% of the project as grant to laboratories / IITs/ Universities/ NGOs and other similar non-profit organizations and 1/3rd of the project cost as grant to public sector /joint sector/Assisted sector/Private sector.

	development of new cost effective packaging for food products based on traditional foods, common food grains. Agriculture universities, Research Institutions, Industry Associations, NGOs, Private, Public and Joint sector companies doing R&D are eligible.	
5.	Development of infrastructure facilities has 3 components	50% of the cost of capital equipment and technical civil works up to Rs.25/50/150 lacs in general areas and up to Rs.50/ 75/200 lacs in difficult areas, as grant or loan.
5.1.	Establishment of food processing industrial estates/food parks to create common facilities for QC, cold storage and warehousing.	Up to Rs.4 crores for the creation of common facilities as grant to PSU/Joint / Assisted /Private sector/ NGOs / Cooperatives.
5.2.	Infrastructure facilities for preservation, land processing of fish	Depending upon the type of unit, 50% of the cost of capital equipment and technical civil works and up to Rs.25 lacs in general areas and up to Rs.50 Lacs in difficult areas as grant or loan.

6.	Human resource development in food processing industries specifically in rural areas through FPTCs - Food Processing and Training Centers, Grain Processing Industries , meat processing, training of traditional fisher persons, etc. & creation of infrastructure facilities.	To FPTCs, depending upon whether it is single product line center or multi product line center, Rs.2 to Rs.7.50 lacs for fixed capital cost and Rs.1 to 2 lacs as revolving seed capital, as grant. In specific cases, assistance up to Rs.4000 per trainee, grant up to Rs.50 lacs to HRD institutions such as colleges and universities.
7.	Setting up of innovative dairy projects, such as whey protein, protein concentrates, extraction of minerals, casein etc.	50% of cost of capital equipment and technical civil works, up to Rs.75 lacs in general areas and up to Rs.100 lacs in difficult areas as loan
8.	Generic advertisement on processed foods and marketing assistance, to build awareness among consumers about advantages of processed foods.	50% of the cost of campaign up to Rs.25 lacs as grant, disbursement depending upon the type of Organization.
9.	Strengthening of nodal agencies, for installation of basic office hardware	Grant of Rs.3 lacs for purchase of hardware. Additional sum up to Rs.50,000 also available

In addition, there are various other schemes operated by department of food processing Industries under Ministry of Agriculture for:

- Strengthening of traditional fish processing technologies & marketing
- Utilization of low value fish to make value added products.
- Strengthening of backward linkages of food processing industries
- Promotion of food processing industries.
- Setting up of demonstration units/pilot projects.

4.5.4.2 Various schemes operated by National horticulture Board (NHB):

Table 4.20 National Horticulture Board (NHB) Schemes

National Horticulture Board (NHB) Schemes		
1.	Development of commercial horticulture through production and post harvest management The NHB schemes are varied and depend upon whether the project is production/ processing/ marketing related and range from bee-keeping to Bio-technology, horticulture covering a vast spectrum of components.	Back-ended subsidy varies from 20 % of the project cost with a maximum of Rs.25 lacs.

2.	Capital investment subsidy for construction/modernization/ expansion of cold storage and other storages for horticulture produce.	In collaboration with NABARD& NCDC projects up to 5000 MT capacity and not exceeding Rs.2 Crores with 25% promoter's contribution, 50% term loan & 25% capital investment subsidy.
3.	Technology development and transfer. This includes introduction of new technologies, expert services from abroad, seminars, study tours etc.	100 %financial assistance up to Rs.10 lacs/ project for production related and Rs.25 lacs to R&D efforts and actual/ limited reimbursement of expenses.
4.	Market Information service for Horticulture crops. Information of wholesale prices, arrivals, trends.	100% financial assistance
5.	Horticulture promotion service. Techno-economic feasibility studies, develop strategies etc.	100% financial assistance and studies through professional consultants.

4.5.4.3 Agricultural and Processed Food Products Export Development Authority (APEDA)-Under the Ministry of Commerce, Government of India.

The Agricultural and Processed Food Products Export Development Authority (APEDA) was established in 1986 to further develop our agricultural commodities and processed foods, and to promote their exports. Its primary mission is to maximize foreign exchange earnings through increased agro exports; to provide better income to the farmers through higher unit value realization and to create employment opportunities in rural areas by encouraging value added exports of farm produce.

Table 4.21 Financial assistance schemes by APEDA

APEDA has a number of financial assistance schemes		
1	For feasibility studies, surveys, consultancy & data base up-gradation	50% to 100% of the cost subject to ceiling of Rs.2 lacs to Rs.10 lacs
2	For infrastructure development, such as purchase of specialized transport units for meat, horticulture and floriculture sector, packaging material, sheds for intermediate storage & grading, fumigation etc.	25% to 50% of the cost subject to a ceiling of Rs.2.50 to 5 lacs per beneficiary.
3	Scheme for packaging development including standards and design for domestic and export markets.	50% or Rs.5 lacs of cost of development
4	Scheme for assistance to promote quality and quality control	50% of the cost subject to a ceiling of Rs.2 lacs per beneficiary.

4.5.4.4 Incentives from the state government of Gujarat in agro. Industries

Table 4.21 Incentives from the state government of Gujarat in agro. Industries

Financial Incentives	Quantum of Incentives
Interest Subsidy to agro Industrial units.	6% back ended subsidy for 5 years on the interest on term loan subject to a ceiling of Rs. 100 lacs
Interest Subsidy to Agri Infrastructure Projects	6% back ended subsidy for 5 years on the interest on term loan, subject to a ceiling of Rs.400 lacs on term loan.
Assistance for Preparation of Project Report.	50% of the expenditure of the cost of the preparation of a project report for setting up Agro industrial unit, subject to a ceiling of Rs.5 lacs.
Assistance for setting up of Center of Excellence/ scientific crop development Institute.	50% of the initial capital investment as assistance, subject to a ceiling of Rs.500 lacs. If such an institute is established under the Company Law, the assistance shall be provided in the form of equity.
Assistance for Patent Registration.	Reimbursement up to 50% of the cost of patent registration, subject to a ceiling of Rs 5 lacs.
Quality Certification Mark Assistance.	50% of the actual expenditure subject to a ceiling of Rs.5 lacs is available to small and tiny Agro industrial units.
Air freight subsidy	25% subsidy shall be provided on air freight for exports of edible produces like mango, chiku, banana, tomato and such other products as specified by the State government from time to time, from the Sardar Patel International Airport, Ahmadabad, subject to" a ceiling of Rs. 10 lacs per beneficiary.
Assistance for sending samples abroad	50% of the actual expenditure incurred for sending samples abroad subject to ceiling of Rs.50,000/-
Assistance for R & D	50% of the expenditure incurred on research activity subject to ceiling of Rs.20 lacs.

V. SUMMARY AND CONCLUSION

India is the world's largest producer of mangos having an annual production of 150.13 lakh tonnes in 2007-08 (NHB). Despite large mango production, India is a minor exporter of mango and mango products. The major mango growing states are Uttar Pradesh, Andhra Pradesh, Karnataka, Tamil Nadu, Maharashtra, Gujarat, Orissa, Kerala and West Bengal. These nine states together accounted for over 92.6 per cent of area and 95.4 per cent of production of mango in the country in the year 2008-09. There are many varieties of mango cultivated in India. The major varieties are Dasehari, Alphonso, Kesar, Banganpalli, Totapari, Langara, Mallika, Chausa etc.

The varieties used for making the mango pulp are Totapari, Alphonso and Kesar. There is high demand for these varieties for mango pulp. Mango pulp is made from fully ripened and fresh mango.

Andhra Pradesh, Uttar Pradesh and Karnataka are three leading states in Mango production with 29%, 22% and 10% share in total mango production of India. Gujarat is producing 930.1 thousand MT mangoes, which accounts for about 7% of total mango production in the country.

Junagadh is the potential district for raw material as the production of mango is highest with 54016 MT. in this district which is 18.1% of total production in Gujarat and 40% of Kesar mango in Gujarat. Within Junagadh, Talala is the highest producing taluka followed by Una with 17984 MT. and 9760 MT. respectively.

Valsad is the second potential district for raw material with 48480 MT. This is 16% of the total mango production of Gujarat and 20% of Keshar in Gujarat. Within Valsad, Valsad and Pardi are the main Talukas with 85736 MT. and 63072 MT. productions.

Navasari is the third potential district for raw material with 45120 MT, which contributes about 15% of total mango production of Gujarat and 20% of the Keshar of Gujarat. In Navasari, Chikhali and Gandevi are leading taluka in mango production with 17620 MT. and 10175 MT. respectively.

Indian food processing sector is among the largest sectors in terms of production, consumption, export and growth prospects. Also, the government of India has made the commercialization of the country's food processing sector the first priority, with various fiscal incentives. So, there's a vast scope for the companies willing to invest in the food processing & packaging sector- a sector that's growing 15%-20% annually. Increased literacy rate, change in lifestyle, and mass media promotion are amongst the major contributors to the growing demand of processed food in the country.

One of the major challenges before the food processing industry in India, currently, is the lack of proper infrastructure. Only two percent of agricultural produce is estimated to be preserved for processing in India, currently, due to the lack of storage facilities. While in US, the about seventy percent of agricultural produce is processed at present.

During the project, two marketing channels for mango distribution from farmers to industry were observed in the identified districts of Junagadh, Navsari, and Valsad. The major players of the channel I were Farmers, wholesalers/agents

and industry and for the channel II farmers, local vendor, wholesalers/ agents and industry were identified.

In all the cases, channel without local vendors was found to be more efficient as compared to channel with local vendors.

Gujarat govt. also provides support for starting processing industry in the state. It gives subsidy for the agro industry units and agro infrastructure up to 6% for 5 years on interest on term loan with a ceiling of 100 lacs & 400 lacs respectively. Govt. also provides the initial investment of up to 50% with ceiling of Rs.500 lacs. In addition, there is provision of reimbursement of up to 50% of cost of patent registration with ceiling of Rs. 5 lacs.

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ANNEXURE : 1

Questionnaire for Farmers

Name: - _____ **Date: -** _____

Address: - _____ **Contact No.: -** _____

Sr. No.	Questions						
1.	Experience of mango Cultivation.						
2.	Variety commonly used.						
3.	Total land						
4.	Land For mango						
5.	Total plant in orchard						
6.	No of plant variety wise	kessar	Alphanso	Rajapuri	Desehari	totapuri	Others
7.	Age wise plant	0-5 year		5-15 year		More than 15 year	
8.	Season of mango						
9.	Harvesting: - Labour Req.: -	Stage: - How many times: -					
10.	Total Yield/ha.						
11.	Cost of Packaging.						
12.	Packaging						

	material used.	
13.	Last year price farmer get	
14.	Market	
15.	Mode of transportation.	
16.	Total expense	
17.	Ready for direct selling.	
18	Ready for contract farming	

ANNEXURE : 2

Questionnaire for APMCs Market

Name: - _____ **Date: -** _____

Address: - _____ **Contact No.: -** _____

Sr. No.	Questions	
1.	Season of mango production.	
2.	Preferable varieties of buyers.	
3.	Arrival of mango in the market. (From Farmer to industry) (Transportation)	
4.	Price Structure.	Farmer level: Wholesaler level:
5.	Grade specification in market. (Acc. To buyer).	
6.	How marketing is done. (Farmer to industry)	
7.	Time requirement for marketing	Farmer to customer: Self life:
8.	Major buyer	
9.	Major seller	
10.	Packaging material. (repacking)	
11.	Supply and demand.	

ANNEXURE : 3

Questionnaire for Mango processing Industry

Industry Name: - _____

Date: - _____

Address: - _____

Contact No.: - _____

Sr. No.	Questions	
1.	Source of raw material	
2.	Preferable varieties	
3.	Which product manufactured in industry	
4.	Production capacity	
5.	How many product manufactured	
6.	In which countries process mango product export	
7.	Price of the product	
8.	Major importers	
9	Product segment	

ANNEXURE : 4

Important information collected from Junagadh farmers:-

SR. NO.	FARMER NAME	ADDRES	COTACT NO.	TOTAL LAND	FOR MANGO CROP	TOTAL PLANT	VARIETY OF MANGO					
							KESHAR	RAJA PURI	ALPHANSO	DESEHARI	TOTA PURI	OTHERS
1	RASIK BHAI RATHOR	MOTA KAJALIALA, VANTHLI		50	40	250	230	0	0	0	20	0
2	BHARAT BHAI	MOTA KAJALIALA, VANTHLI	9328023929	40	15	100	100	0	0	0	0	0
3	PARVAT BHAI	MOTA KAJALIALA, VANTHLI	9712192587	50	12	130	120	0	0	5	5	0
4	KISHOR BHAI	MOTA KAJALIALA, VANTHLI	9427738978	50	12	130	120	5	0	5	0	0
5	BAJU BHAI	KANDJA, VANTHLI	9909063353	15	10	120	120	0	0	0	0	0
6	MAGAN BHAI	KANDJA, VANTHLI	8140637058	60	40	500	460	0	0	20	0	20
7	RAMJI BHAI	KANDJA, VANTHLI		40	20	250	230	0	0	0	20	0
8	MANISH BHAI	KANDJA, VANTHLI	9427447464	40	35	350	300	20	0	10	20	0
9	NILESH BHAI	KANDJA, VANTHLI	9909690195	25	15	150	140	0	0	0	0	10
10	BHAVESH BHAI	KANDJA, VANTHLI	9737746246	40	25	300	300	0	0	0	0	0
11	KHODA BHAI	TINMUS, VANTHLI	9725516078	30	15	80	80	0	0	0	0	0
12	USMAN BHAI	TINMUS, VANTHLI		20	10	120	120	0	0	0	0	0

13	KHIM BHAJ	TINMUS, VANTHLI	9925246687	15	8	100	100	0	0	0	0	0
14	KASAM BHAJ	TINMUS, VANTHLI	9374356477	50	25	270	200	0	10	10	40	10
15	SATRANA BHAJ	TINMUS, VANTHLI	9725324467	70	50	400	400	0	0	0	0	0
16	LAKHA BHAJ	TINMUS, VANTHLI		80	60	500	400	25	10	25	30	10
17	PURSOTTAM BHAJ	THANAPIPLI, VANTHLI	9428567789	60	50	500	450	0	10	20	20	0
18	SURESH BHAJ	THANAPIPLI, VANTHLI	9428335490	70	60	550	500	0	20	10	20	0
19	VAJU BHAJ	KHOKHARADA, VANTHLI		50	40	400	360	10	5	10	10	5
20	BHAVEN BHAJ DANGAR	KHOKHARADA, VANTHLI	9737662987	60	50	540	500	20	0	20	10	0
21	JANAK BAHJ	KHORSA, VANTHLI		30	25	200	200	0	0	0	0	0
22	AMRIT BHAJ	KHORSA, VANTHLI	9328347690	40	25	300	280	0	0	20	0	0
23	BINA BHAJ	KHORSA, VANTHLI		20	15	180	180	0	0	0	0	0
24	JAGGU BHAJ	AMAR GHAR, MENDERDA	9825771638	50	33	400	400	0	0	0	0	0
25	JIGA BHAJ	AMAR GHAR, MENDERDA	9016170663	50	25	300	250	0	0	50	0	0
26	CHANDRESH BHAJ	AMAR GHAR, MENDERDA	9879790460	25	18	400	340	0	0	40	20	0
27	PACHA BHAJ	AMAR GHAR GAM, MENDERDA	02872-241234	25	20	200	200	0	0	0	0	0
28	VIJAY BHAJ	AMAR GHAR GAM, MENDERDA	9328690184	30	22	200	180	0	0	20	0	0
29	GHAN SHYAM	NAJA PUR, MENDERDA	9879247734	50	40	600	500	0	0	50	50	0

	BHAI											
30	VIJAY BHAI	NAJA PUR, MENDERDA	9909184054	20	15	145	145	0	0	0	0	0
31	VIPUL BHAI	NAJA PUR, MENDERDA	9925767758	30	15	150	150	0	0	0	0	0
32	VINAY BHAI	NAJA PUR, MENDERDA		50	50	500	400	10	10	50	20	10
33	ASHWIN PATEL	NAJA PUR, MENDERDA	9925336156	15	15	150	150	0	0	0	0	0
34	RAJESH PATEL	NAJA PUR, MENDERDA	9913887631	45	30	300	250	10	10	10	10	10
35	JAYESH BHAI	VIRPUR, TALALA	8102858924	30	10	220	220	0	0	0	0	0
36	KAMLESH PATEL	VIRPUR, TALALA	9840222498	35	20	400	400	0	0	0	0	0
37	KARSAN BHAI	VIRPUR, TALALA		20	10	175	175	0	0	0	0	0
38	NATU BHAI	VIRPUR, TALALA	9909738520	20	12	240	200	0	0	40	0	0
39	RAMESH BHAI	DHABA, TALALA	0877-289346	50	30	400	400	0	0	0	0	0
40	BHAGVAN BHAI	DHABA, TALALA	9909311631	50	20	350	350	0	0	0	0	0
41	PITHA BHAI	MALJIJWA, TALALA	9429766298	25	13	175	175	0	0	0	0	0
42	ARJAN BHAI	MALJIJWA, TALALA	9426833321	25	25	250	250	0	0	0	0	0
43	DEVSI RANA	MALJIJWA, TALALA	9427379006	25	12	175	175	0	0	0	0	0
44	BHAVESH BHAI	MALJIJWA, TALALA	9429432917	30	17	250	200	0	0	25	10	15
45	BHAMA BHAI	MALJIJWA, TALALA	9426768356	50	30	350	350	0	0	0	0	0
46	BACHU BHAI	MALJIJWA, TALALA	287919	38	25	300	300	0	0	0	0	0
47	MOHAN BHAI	SEMAR VAV, TALALA	9601549417	30	10	150	150	0	0	0	0	0

	SHALES BHAI	SEMAR VAV, TALALA	9428577385	40	25	300	300	0	0	0	0	0
48	DHARMESH BHAI	SEMAR VAV, TALALA	9714538850	50	40	500	400	0	0	100	0	0
49	BAJU BHAI	SEMAR VAV, TALALA	9979373350	30	10	160	160	0	0	0	0	0
50	MANU BHAI BARAD	UMRETHI, TALALA	9428775606	160	60	600	600	0	0	0	0	0
51	AJIT SOLNKI	UMRETHI, TALALA	9428015499	35	20	240	240	0	0	0	0	0
52	BHIM SINGH KADA	UMRETHI, TALALA	9428015498	150	60	600	600	0	0	0	0	0
53	DHIRU BHAI	UMRETHI, TALALA	9427975215	40	15	200	200	0	0	0	0	0
54	JHINA BAKU	UMRETHI, TALALA	9925987746	25	10	120	120	0	0	0	0	0
55	RANA BHAI	GHUSIYA, TALALA	9426995921	20	15	180	180	0	0	0	0	0
56	HAMIR BHAI SOLNKI	GHUSIYA, T ALALA	9824327429	40	15	200	200	0	0	0	0	0
57	VAJU BHAI RUDANI	SASAND GIR, TALALA	02877- 285526									
58	VIVEK PATEL	DHAWA, TALALA	9879841740	150	100	1200	1000	0	0	200	0	0
59	P.M. PATEL	DHAWA, TALALA	9904029002	100	50	500	500	0	0	0	0	0
60	UDAYA BHAI	DHAWA, TALALA	9879562384	50	40	450	450	0	0	0	0	0
			02877- 289621									
61	ABHAY K. ROLA	DHAWA, TALALA	9099283132	100	80	800	700	0	0	80	20	0
62	RANCHOD	GIR		40	30	300	300	0	0	0	0	0

	BHAI	GHADHA, UNA										
63	RAMDIK BHAI PATEL	GIR GHADHA, UNA	9979065122	50	35	400	350	0	0	50	0	0
64	HARI BHAI	GIR GHADHA, UNA	9979435672	40	25	260	260	0	0	0	0	0
65	RANA BHAI	KAKDI MOLI, UNA	9426924545	50	30	350	300	0	0	30	20	0
66	LALJI BHAI BUSA	KAKDI MOLI, UNA	9274518451	30	20	200	200	0	0	0	0	0
67	JIGNESH BHAI	KAKDI MOLI, UNA	9723646162	60	50	500	400	0	0	80	10	10
68	NALIN BHAI	PANWADI, UNA	982576260	80	60	700	700	0	0	0	0	0
69	BIPIN BHAI	PANWADI, UNA	9662396145	40	35	350	350	0	0	0	0	0
70	RAMESH BHAI	AMBADA, UNA	9974602150	60	35	400	300	20	0	50	10	20
71	ANIRUDHA BHAI	AMBADA, UNA	9662180424	20	15	180	180	0	0	0	0	0
72	DHIRU BHAI PATEL	AMBADA, UNA	9723588493	50	25	300	300	0	0	0	0	0
73	BATUK BHAI	JHUDHWADLI, UNA	9725795088	40	30	300	300	0	0	0	0	0
74	PRATAP BHAI	JHUDHWADLI, UNA	9924037849	20	15	150	150	0	0	0	0	0

ANNEXURE : 5

Important information collected from Navasari farmers:-

SR. NO.	FARMER NAME	ADDRES	COTACT NO.	TOTAL LAND	FOR MANGO CROP	TOTAL PLANT	VARIETY OF MANGO	VARIETY OF MANGO				
								KESHAR	RAJA PURI	ALPHANSO	DESEHARI	TOTA PURI
1	CHAGAN LAL PATEL	ARU GAM, JALAL POR	283032	30	25	250	75	75	75	10	15	0
2	MATHUR BHAI	ARU GAM, JALAL POR		40	30	300	50	100	100	20	20	10
3	DHARMESH BHAI	ARU GAM, JALAL POR		20	10	120	20	50	50	0	0	0
4	SURESH BHAI	ARU GAM, JALAL POR		30	15	150	40	40	50	0	10	10
5	DAYA BHAI	ARU GAM, JALAL POR	283009	50	30	350	70	80	150	25	25	0
6	ISWAR BHAI	ARU GAM, JALAL POR		20	10	120	40	40	40	0	0	0
7	JAYESH BHAI	ATHAN, JALALPOR	9913751392	50	30	350	50	100	150	25	25	0
8	DEEPAK BHAI	ATHAN, JALALPOR	9099399966	30	25	230	30	100	100	0	0	0
9	JAY BHAI PATEL	ATHAN, JALALPOR	9429450945	60	50	600	50	200	200	60	60	30
10	MUKESH BHAI	ATHAN, JALALPOR		20	20	200	20	100	80	0	0	0
11	JIVANU BHAI	ATHAN, JALALPOR		30	20	150	30	50	50	0	20	0
12	DENU BHAI	ATHAN, JALALPOR		40	20	160	40	50	50	0	20	0

13	MOHAN KPOOR	TORAN GAM, GANDEVI		40	20	170	50	20	100	0	0	0
14	VINOD BHAI	TORAN GAM, GANDEVI		50	40	375	75	200	50	25	25	0
15	MADHU BHAI	TORAN GAM, GANDEVI		20	10	100	15	15	50	0	20	0
16	THAMER BHAI	TORAN GAM, GANDEVI	63280	20	9	100	20	10	40	0	30	0
17	PRATIM BHAI	TORAN GAM, GANDEVI	9825769551	50	30	250	40	100	50	0	60	0
18	PRAKASH BHAI	SAMRAVADI, GANDEVI	9429058570	40	30	375	60	100	140	30	45	0
19	SIRISH BHAI	SAMRAVADI, GANDEVI	02634-262662	30	20	200	20	100	60	0	20	0
20	DEEPAK BHAI NAYAR	SAMRAVADI, GANDEVI	263727	40	25	300	40	100	60	50	50	0
21	URVISH BHAI	SAMRAVADI, GANDEVI	262088	50	40	500	100	100	200	50	50	0
22	JAYESH BHAI	AMARAVADI, NAVSARI	9375977838	50	30	390	300	20	40	20	10	0
23	VALVANT RAM NAYAK	AMARAVADI, NAVSARI	02637-240395	50	30	400	300	30	40	20	10	0
24	BASANT BHAI DESAI	AMARAVADI, NAVSARI	9375977839	80	70	800	300	200	200	20	80	0
25	CHAGAN BHAI	PERA, NAVSARI	226372	45	30	500	300	0	0	0	200	0
26	NATHU BHAI	PERA, NAVSARI		30	20	150	20	30	40	30	30	0
27	MAGAN BHAI KUVAR GI	PERA, NAVSARI		40	20	160	30	30	40	30	30	0

28	ARVIND BHAI NAYAK	PADGHA, NAVSARY	9825822861	50	30	250	100	30	50	20	50	0
29	NAVIN BHAI	PADGHA, NAVSARY	252303	40	30	300	100	40	60	30	60	10
30	DEELIP BHAI	SUPAGHAM, NAVSARY	9727924734	40	20	150	40	40	40	20	10	0
31	SHER ALI	SUPAGHAM, NAVSARY	252303	50	30	300	100	50	50	50	50	0
32	SHALES SOLNKI	SUPAGHAM, NAVSARY	9727185223	40	30	250	100	30	40	50	30	0
33	AJIT BHAI	AMADPUR, NAVSARY	9898040647	200	180	5000	1000	1000	1000	1000	1000	0
34	HITU BHAI	AMADPUR, NAVSARY		40	30	300	100	50	50	50	50	0
35	DINESH BHAI	AMADPUR, NAVSARY		20	10	100	20	30	40	0	20	0
36	VIPUL BHAI	AMADPUR, NAVSARY	9428714420	40	30	250	50	50	50	60	40	0
37	ROHIT BHAI	AMADPUR, NAVSARY	9624860092	50	30	300	60	60	60	60	60	0
38	NAROTTAM BHAI	AMADPUR, NAVSARY	9824903609	100	70	600	200	150	100	50	80	20
39	MAGAN BHAI PATEL	AMDHARA, CHIKHLI	9925664346	50	30	250	150	50	50	0	0	0
40	MAHESH BHAI	AMDHARA, CHIKHLI	9427142085	60	20	200	50	25	100	25	0	0
41	SANDEEP BHAI PATEL	PIPALGBHAN, CHIKLI	9426595522	200	200	3500	500	500	500	1000	400	600
42	BASANT DESAI	PIPALGBHAN, CHIKLI	9979442026	100	50	500	100	50	200	100	50	100

43	ARVIND DESAI	SOLDHARA, CHIKLI		500	400	5000	1000	500	1000	2000	200	300
44	RAJA BHAI	BAMANBHADA, CHIKLI	9925628196	30	20	200	40	40	100	20	0	0
45	RAMAN BHAI	BAMANBHADA, CHIKLI	9428228649	20	10	120	50	0	70	0	0	0
46	RANA BHAI DESAI	SAMROLI, CHIKLI	9327338754	30	25	300	100	40	80	50	20	10
47	VARUN BHAI	SAMROLI, CHIKLI	9925663782	50	30	300	50	50	100	50	30	20
48	RANA BAHAI	KHERGAM, CHIKLI	9327293476	60	40	450	60	40	200	100	30	20
49	KARAN BHAI	KHERGAM, CHIKLI		30	20	200	30	40	100	30	0	0
50	JIGNESH BHAI	KHERGAM, CHIKLI	9601445367	80	50	500	200	100	100	50	50	0
51	DHIRU BHAI	TEJLAW, CHIKLI		30	20	200	20	20	100	50	10	0
52	DHARMESH BHAI	TEJLAW, CHIKLI	9428943562	40	35	400	100	100	100	100	0	0

ANNEXURE : 6

Important information collected from Valsad farmers:-

SR. NO.	FARMER NAME	ADDRES	COTACT NO.	TOTAL LAND	FOR MANGO CROP	TOTAL PLANT	VARIETY OF MANGO					
							KESHAR	RAJA PURI	ALPHANSO	DESEHARI	TOTA PURI	OTHERS
1	DHARMESH BHAI	PARNERA PARDI, VALSAD	9375825161	20	8	100	60	0	40	0	0	0
2	JIGNESH BHAI	PARNERA PARDI, VALSAD		50	36	400	100	50	100	30	80	40
3	DIVYANK BHAI PATEL	PARNERA PARDI, VALSAD	9374437767	60	50	480	100	80	120	50	80	50
4	ARUN BHAI	PARNERA PARDI, VALSAD	9377923405	40	30	250	100	30	100	10	10	0
5	BHUPESH BHAI	PARNERA PARDI, VALSAD		50	25	230	50	50	60	50	20	0
6	VIJAY BHAI	PARERA LIMDA CHOK, VALSAD	9979645556	30	20	180	30	40	50	30	20	10
7	DINESH BHAI	PARERA LIMDA CHOK,		50	40	420	140	100	120	30	20	10

		VALSAD										
8	RAJESH BHAI	PARERA LIMDA CHOK, VALSAD	9979184611	30	15	150	100	0	40	10	0	0
9	GANPAT BHAI	PARERA LIMDA CHOK, VALSAD		25	12	100	40	20	20	0	20	0
10	SURESH BHAI	KAJAN HARI, VALSAD	9601738661	40	24	300	90	30	60	60	50	10
11	RAMAN BHAI	KAJAN HARI, VALSAD	9374723405	50	30	320	80	50	60	80	30	20
12	CHANDRA KANT BHAI	KAJAN HARI, VALSAD		30	20	180	50	50	50	30	0	0
13	BHIGU BHAI	BHAGOT, VALSAD		20	15	140	40	35	25	20	10	10
14	BHARAT BHAI DESAI	BHAGOT, VALSAD		50	40	420	100	100	150	50	20	0
15	BHASKAR BHAI	BHAGOT, VALSAD		60	40	450	140	100	140	50	10	10
16	ASHOK BHAI PATEL	TITHAL, VALSAD		50	40	400	100	50	150	40	40	20
17	CHETAN BHAI	TITHAL, VALSAD		30	20	200	40	40	50	50	20	0
18	DHIRU BHAI	SEGVI, VALSAD		40	25	270	60	75	35	60	20	20
19	ARUN BHAI	SEGVI, VALSAD		30	15	160	30	30	40	30	20	10
20	DEELIP BHAI	SEGVI, VALSAD		40	35	380	60	50	100	90	60	20

21	MOHAN BHAI PATEL	SEGVI, VALSAD		50	30	320	100	30	90	40	40	20
22	RAMAN BHAI PATEL	OWADA, VALSAD	9913907740	30	20	180	50	30	40	30	30	0
23	MOHAN BHAI DESAI	OWADA, VALSAD		30	25	260	75	65	80	30	10	0
24	MANOJ BHAI	OWADA, VALSAD	9879296558	30	10	140	50	20	40	20	10	0
25	KHANDU BHAI	FALDHARA, VALSAD	02632- 275010	30	15	160	40	20	40	0	30	30
26	SATISH BHAI	FALDHARA, VALSAD	02632- 275141	40	30	340	70	50	100	40	50	30
27	PRAVEEN BHAI	AMBAJ, PARDI	9727181981	50	35	380	65	35	140	50	70	20
28	JAYANTI BHAI	AMBAJ, PARDI	0260- 2318105	40	30	280	60	40	60	40	50	30
29	VIPIN BHAI PATEL	AMBAJ, PARDI	9879202406	30	25	270	70	50	100	30	20	0
30	NARENDRA DESAI	PALSANA, PARDI	9824126396	40	25	260	50	50	70	50	30	10
31	DINESH BHAI	PALSANA, PARDI	9898962096	30	15	160	30	40	40	30	20	0
32	RAMAN BHAI	PALSANA, PARDI		20	10	100	20	10	40	20	10	0
33	JAYANT KUMAR DESAI	TUKWADA, PARDI	9913019901	30	18	200	60	40	65	20	15	0
34	ABHAY SINGH THAKOR	TUKWADA, PARDI		20	15	170	50	40	60	20	0	0

35	RITURAJ BHAI	TUKWADA, PARDI	8000006053	40	35	400	200	50	100	30	20	0
36	KIRSNA KUMAR DESAI	UARWAD, PARDI	9925837328	100	80	900	100	100	600	50	40	10
37	NALIN BHAI	UARWAD, PARDI	9925412412	15	10	100	40	20	30	0	10	0
38	SUBHAS BHAI DESAI	UARWAD, PARDI	9879340039	90	70	750	100	50	500	50	40	10
39	NILESH BHAI	UARWAD, PARDI	9825541402	40	25	300	100	30	100	50	10	10
40	BHIGU BHAI	UARWAD, PARDI	9992527913	30	25	300	80	30	90	60	30	10
41	RAMESH BHAI	WAKAL, DHARMPUR		20	18	190	50	40	60	20	10	10
42	RATI LAL	WAKAL, DHARMPUR		30	25	300	80	40	100	30	40	10
43	FATTEH SINGH	WAKAL, DHARMPUR		50	40	420	150	50	100	40	60	20
44	HASMUKH BHAI	VODLAE , DHARMPUR		20	10	120	100	0	20	0	0	0
45	MANU BHAI	VODLAE, DHARMPUR		25	20	200	150	20	30	0	0	0
46	DAYA BHAI	VESDHARA, DHARMPUR	9586155867	40	30	300	100	50	80	40	20	10
47	AWAL BHAI	VESDHARA, DHARMPUR		20	10	80	60	0	20	0	0	0
48	DHANJI BHAI	RAJPURI JANGAL, DHARMPUR	02633- 240176	20	12	120	20	10	40	20	20	10
49	SADIRAM BHAI	TAMSADI, DHARMPUR	9978852987	30	20	200	50	40	60	20	20	10

50	RAMESH PARIYA	TAMSADI, DHARMPUR		40	25	280	40	40	70	50	50	30
51	WESTA BHAI	UGATA PANVA, DHARMPUR		40	20	200	150	10	40	0	0	0
52	RAMAN BHAI	UGATA PANVA, DHARMPUR		30	15	160	120	10	30	0	0	0
53	VISHRAM BHAI	FULWADI, DHARMPUR		20	10	100	100	0	0	0	0	0
54	PREMA BHAI	FULWADI, DHARMPUR		40	30	300	200	30	70	0	0	0
55	NAROTTAM BHAI	FULWADI, DHARMPUR		50	40	400	100	40	160	40	40	10
56	SAGAN BHAI	KHANDA BHAVADA, DHARMPUR	9726013129	40	25	300	100	50	50	40	30	30
57	MOHAN BHAI	KHANDA BHAVADA, DHARMPUR		30	15	170	50	30	50	20	20	0
58	MANIK BHAI	BILPURI, DHARMPUR		60	40	450	200	50	50	100	30	20
59	KAMLESH BHAI	BILPURI, DHARMPUR		50	45	450	150	50	150	50	50	0
60	INDU BHAI	CHICHOJHAR ,DHARMPUR		40	30	250	50	50	50	50	50	0
61	MAGAN BHAI	CHICHOJHAR, DHARMPUR		50	45	500	200	50	100	100	50	0
62	GOKHDU BHAI	CHICHOJHAR, DHARMPUR		30	20	250	100	30	50	30	20	20