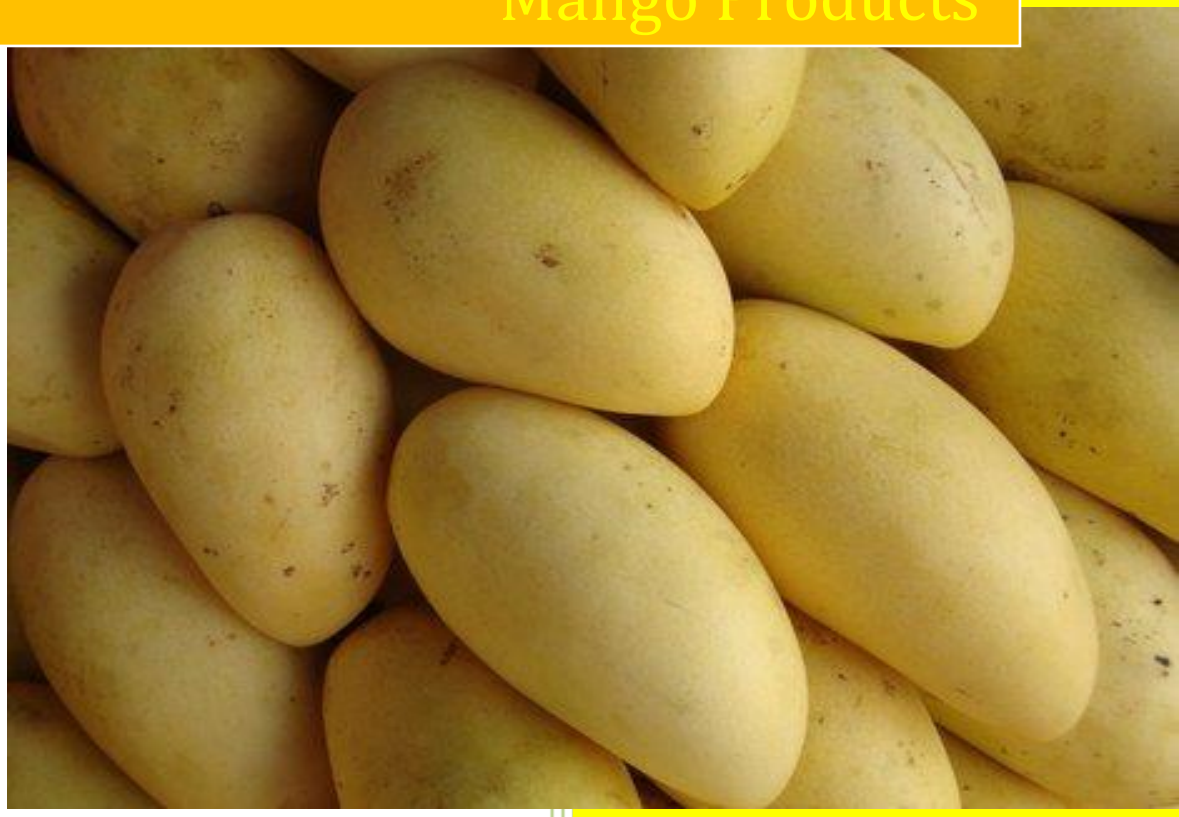
2010

Pre-Feasibility - Mango Pulping Unit and Dry Mango Products



Sindh Board of Investment
Government of Sindh

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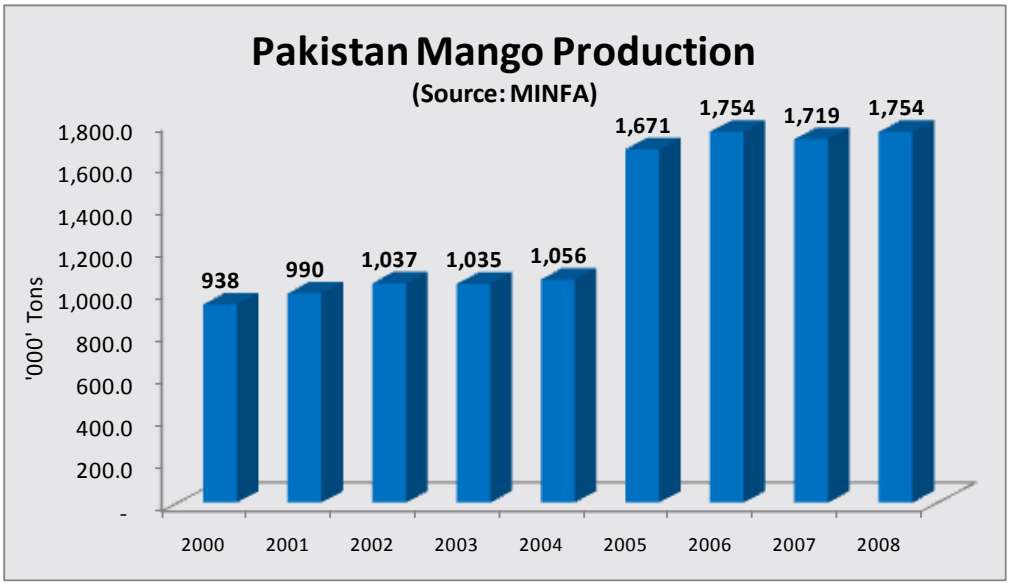
1. OVERVIEW OF MANGO SECTOR

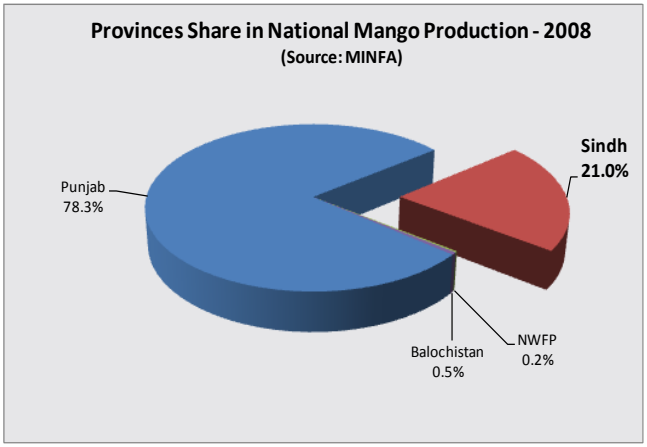
Mango is an important fruit of Sindh, grown in middle and upper districts of the province. Commonly grown varieties of mangoes in Sindh are Sindhri, Saroli, Dasehri, Almas, Langra, Chaunsa, Anwar Ratol, Sunera, Bengal Pali, Laal Badshah, Neelam and Desi. About 80-85% of the mango production of Sindh is that of Sindhri variety.

1.1 Mango Production

Mango is the second largest produced fruit in Pakistan after citrus. Pakistan has shown a healthy growth in mango production during the past five decades. The production grew from 130,000 tons in 1958 to 1,754,000 tons in the year 2008. In 2007, Pakistan was the sixth largest mango producing country after India, China, Mexico, Indonesia and Thailand. Pakistan's share in global mango production was 5.7%. Following graph shows national mango production trend of Pakistan:



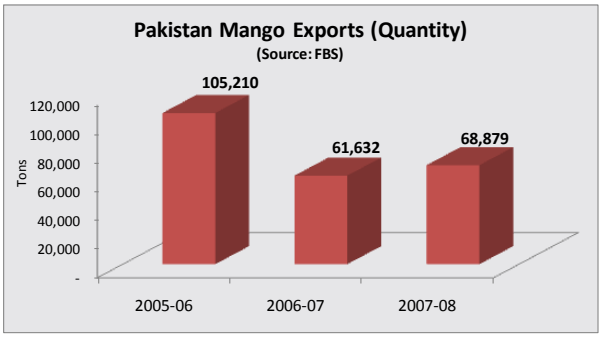
Mango is primarily grown in two provinces; Sindh and Punjab. In 2008, Sindh contributed 21% to the national mango production. During this year, total mango production in Sindh was 368,070 tons from a total cultivated area of 128,690 acres. Five largest mango producing districts of Sindh (in that order) are Sanghar, Nausheroferoz, Tando Allahyar,

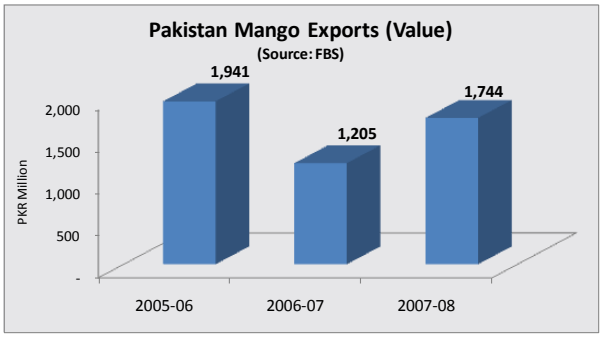


Mirpurkhas and Matiari; accounting for 62% of the total mango production from Sindh.

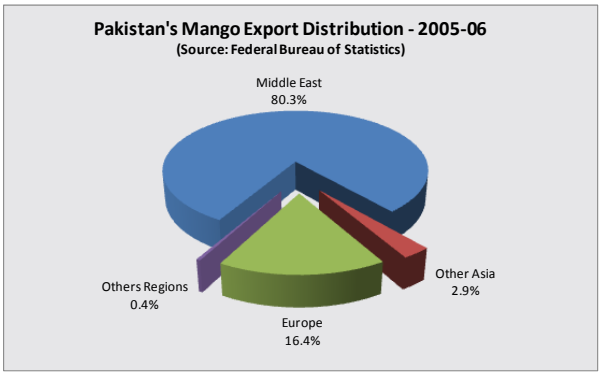
1.2. Mango Export

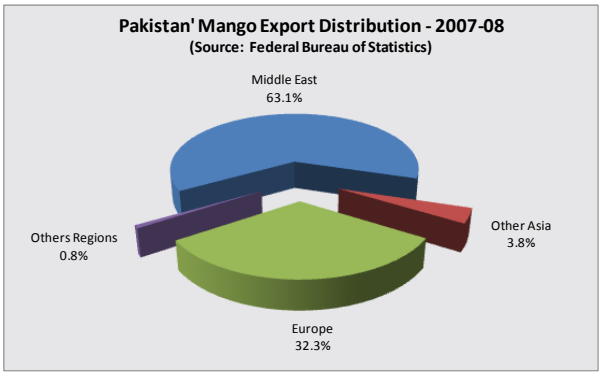
Pakistan is the sixth largest exporter of mangoes in the world. In 2007-08, Pakistan exported 61,632 tons of mangoes; while in 2006-07, export figure was 105,210 tons. Pakistan's compounded annual growth rate of mango exports during the period 2000-07 remained as 3.2%, which was much lower than the export market growth rate of 9.0% during the same time period. This indicates that Pakistan has not been able to tap the growing potential of fresh mango export market. Two main mango varieties exported from Pakistan are Sindhri and Chaunsa; Sindhri being the main variety of Sindh. Three year trend of Pakistan's mango exports are shown in the following figures:





USA is the largest market for mango imports in the world; accounting for about one fifth of the total global mango imports. However, Pakistan has not been able to enter into this market due to quality compliance issues. During the last three years, there has been a shift in distribution of Pakistan's mango exports; shown in the following figures:





Within a period of two years, the share of Europe has doubled to become 32%; while the share of Middle East has shrunk to 63%. This trend is indicative of the diversification strategy adopted by Pakistani mango exporters. Within Middle East,

UAE, Saudi Arabia and Oman are the large importers; while in Europe, UK is the largest importer of Pakistani mangoes.

2. POTENTIAL INVESTMENT PROJECTS IN MANGO SECTOR

Currently approximately 3 per cent of mangoes are processed into value added products such as pulp for use in drinks and ice cream, canned mangoes and dried mangoes. Brief introduction to potential investment opportunities in mango sector in Sindh is provided in the following paragraphs:

2.1. Mango Pulping Facility

Mango pulps are important value added products having demand in both local and export markets. The local market of fruit juices, nectars and drinks has been growing at a very high rate during the past five years. Consequently, the demand for fruit pulps has also increased during this period.

The products will be sold in local and export markets. The proposed facility will contribute towards reducing the post harvest losses, increasing employment opportunities in the area and maximizing crop value for the farmers.

In order to improve the viability of this project, the possibility of adding tomatoes as one of the products for making pulp may also be considered.

2.2. Dried Mango Products

Dried mango is an important value added product processed by all the major mango growing countries; except Pakistan. There is only one pilot scale facility in Tando Allahyar, Sindh which dehydrates mango and supplies its small quantities to local and export markets. Sindhri mango from Sindh has a unique taste and can be converted in dried mango. The project is not capital intensive and affordable to be set up by medium level farmers and/or contractors.

One variation of dried mango product is where mango pulp is dried instead of mango slices. This product is called mango leather and it can be made in different tastes by various additives in the pulp.

2.3. Fresh Mango Grading and Packing Facility

Unlike citrus, grading and packing facilities do not exist for mango in the mango growing areas. There are very few mechanized grading and packing facilities and most of those are located in Karachi. There is a potential for having investment in mango grading and packing facilities in mango growing areas of Sindh.

2.4. Mango Hot Water Treatment Plant

Mango is an important export fruit. Sanitary and phytosanitary requirements of the importing countries are becoming stringent with the passing time. For meeting those requirements, it is important to have hot water treatment facilities for mango; for taking care of the issue of fruit fly. There are some existing facilities in Karachi; however there is potential for establishing more facilities in mango areas of Sindh.

2.5. Mango Vapor Heat Treatment

Sanitary and phytosanitary requirements of mango importing countries differ. There are some countries like Japan which require vapor heat treatment instead of hot water treatment for getting the required satisfaction from the issue of fruit fly. Therefore, this also becomes a potential investment project.

2.6. Irradiation Facility

One important mean for meeting the sanitary and phytosanitary requirements for exporting mangoes is irradiation. This is especially important in the context of exporting mangoes to the largest export market of USA. One such facility has become operational in Lahore. There is potential for establishing a larger facility in Karachi for mango; which will be used for other horticulture/food products. Detailed feasibility study for this project has been developed by Pakistan Horticulture Development and Export Board.

2.7. Mango Chutney & Pickles

Another value added project is making products like mango Chutney, Pickles and Murabbas. Mango pickles of Shikarpur are already famous in Pakistan for their taste and quality, even when Shikarpur is not a major mango area. This existing base of pickles production in Sindh can be further developed to have more investment in such small scale projects. The other important product is mango chutney; which has an export market also; along with the local. Mango chutney is an important value added product of India which is sold in export markets. Mango of Sindh possesses the required attributes for making this product.

2.8. Bottled Mango Juice

Mango juice is a popular product in Pakistan. For the past many decades, mango juice is being consumed by the Pakistanis in bottles. Therefore, this project is an attractive investment opportunity.

3. PRE-FEASIBILITY STUDIES OF THE SELECTED PROJECTS

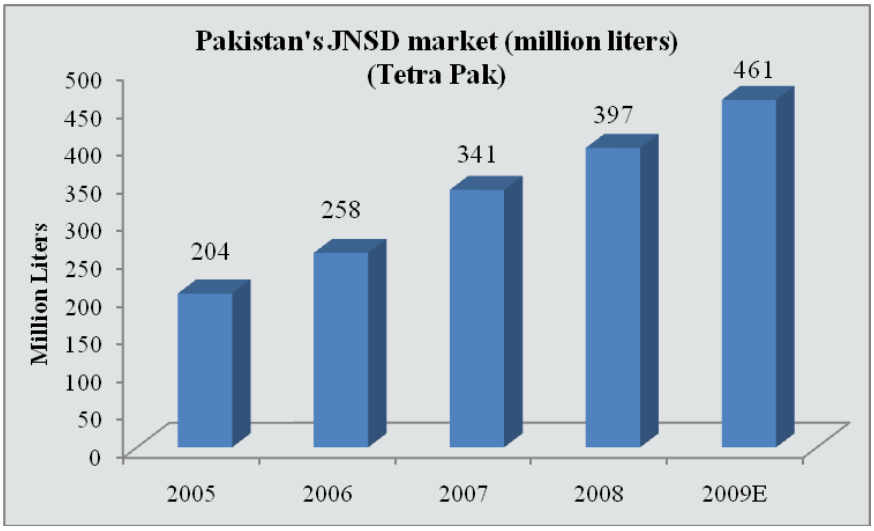
3.1. Multi Fruit Processing Facility (mango)

3.1.1. Market Demand

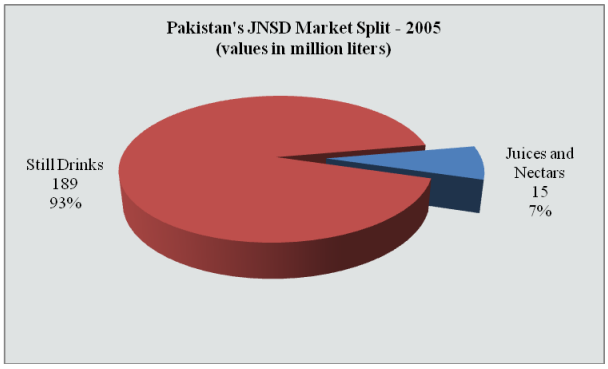
There is a growing demand of mango pulp in local and international markets. Estimated size of export market of mango pulp is over 150,000 tons. India is the largest supplier of mango pulp catering to about two thirds of global demand. International market of mango pulp has been on a rise during the past years. Pakistan is an important exporter of mangoes in the international market but it is not recognized as an important supplier of mango pulp. Quality of the pulps made from Sindhri and Chanusa varieties are comparable to the pulp of Anfonso mango which is exported by India.

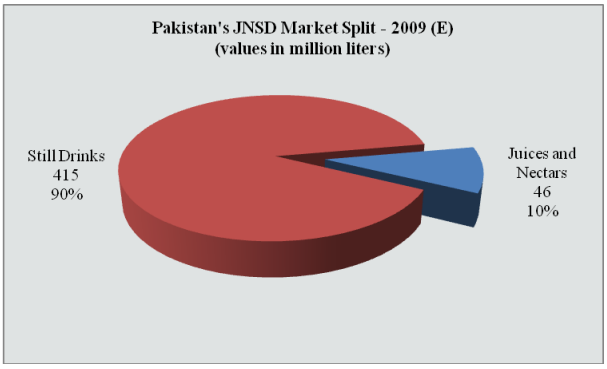
Fruit pulp is the raw material for making ready-to-drinks and juices. Local market for fruit drinks and juices has grown at very high rates during the past years.

The market size of Juice, Nectars and Still Drinks for the year 2009 was 461 million liters. Overall market growth from 2005 to 2009 was recorded at 126%. Pakistan's JNSD market sizes from 2005 to 2009 are shown in the following figure:



Importance of fruit pulps for the local market is further substantiated by the fact that growth in juices and nectars market has been higher than that of still drinks. Juices and nectars require a higher percentage of fruit pulps than those for still drinks. Following graphs show the shift:





Therefore, establishment of mango processing facilities in Sindh will have a receptive local market for pulps.

3.1.2. Existing Players in Fruit Processing

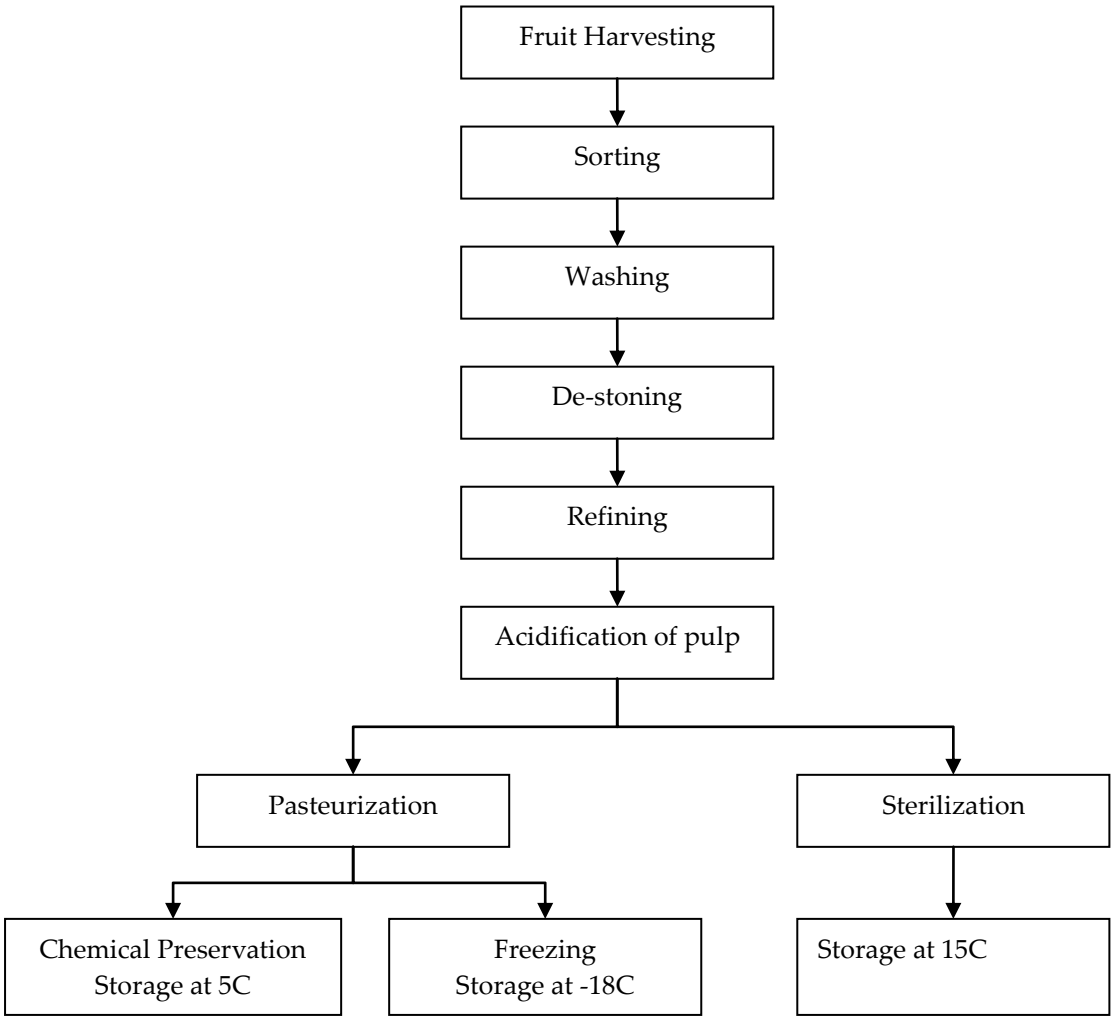
Sr. No	Name of company	Location	Processing Plant size
1	Indus, Bhai Pheroo Lahore	Lahore	5 tons/hr
2	Tops, Muree Brewery Co. Rawlapindi	Rawalpindi	1 tons/hr
3	Standard Fruits (pvt) Ltd. Lahore	Lahore	3 tons/hr
4	Shezan International, Lahore	Lahore	5 tons/hr
5	Popular Foods, Tando Adam Sindh	Tando Adam Sindh	5 tons/hr
6	Shakarganj Fruits, Lalyan, Chiniot	Chiniot	3 tons/hr
7	Iftikhar & Company, Karachi	Karachi	10 tons/hr
8	Mitchell's Fruit Farms, Renala Khurd	Ranala Khurd	5 tons/hr
9	Citro Pak	Sargodha	10 tons/hr
10	Agro Food Processing (SMEDA)	Multan	10 tons/hr
11	Anwar & Company, Faisalabad	Faisalabad	5 tons/hr

3.1.3. Project Description

Fruit pulping unit has to be developed with the aim of processing multiple fruits; so as to increase the number of operational days and increase the financial viability of the project. In line with this, the proposed unit has been designed for processing mango. For further improving the returns from the project the option of adding tomato processing may also be added. This will only require addition of evaporation facility in the setup developed for mango.

Process flow for mango pulping unit is shown in the following figure:

3.1.3.1. Process Flow for Mango Pulping



3.1.3.2. Project Cost

Machinery and Equipment

Equipment	Rupees
Mango processing machinery[1] (10 ton fruit per hour)	125,000,000
Additional machinery for tomato paste (10 ton tomato per hour)	60,000,000
Utility and support machinery and equipment[2]	40,000,000
Cold storage (500,000 kg)	10,000,000
Total machinery and equipment cost	**235,000,000**

Land and Building

5 acre land @ Rs 500,000 per acre	2,5000,000
Building (23,000 sq. ft. @ construction cost of Rs 1200 per sq. ft)	27,600,000
Total cost of land and building	**30,100,000**

3.1.4. Location

The processing facility can be set up in any of the mango growing district. Location of the facility between Hyderabad and Tando Allahyar will ensure proximity to raw material as well as to sea port of Karachi.

3.1.5. Profitability

Mango Pulp
(Based on 1000 kg aseptic mango pulp)

Product Cost (mango pulp)

Cost Item	Quantity	Rate	Cost (Rs/ton pulp)
Mango fruit	1615 kg	Rs 20 per kg	32,300
Aseptic bag	4.7 (no.)	Rs 700 per bag	3,300
Drum	4.7 (no.)	Rs 2100 per drum	9,870
Processing cost		Rs 8000 per ton pulp	8,000
Overheads		Rs 5000 per ton pulp	5,000
Total			**58,470**

[1] Machinery details provided in Annex 1
[2] Machinery details are provided in Annex 2

Profitability

Hours per day	16
Fruit processed per day (@ 10 tons per hr)	160 tons
Pulp yield (from Sindhri)	62%
Pulp produced per day	99.2 tons
Number of production days	50
Total pulp produced	4,960 tons
Mango pulp price	Rs 75,000 per ton
Revenues	Rs 372,000,000
Cost	Rs 290,011,200
Gross Profit	**Rs 81,988,800**

3.2. Dried Mango Products

Dried mango is an important value added product; made by dehydrating mango slices or mango pulp.

3.2.1. Market Demand

Dried mango products are popular in the world. There are different types of products available in this category. Dried mango is made by cutting mango slices and drying those in solar and/or fuel fired dehydrators. Another variation of the product is called mango leather which is made by making mango pulp and drying the pulp. There is demand for dried mango products in international markets. All the major mango producing countries produce and export dried mango products. There is demand of this product in local market also; which is shown by its sale in large retail stores in the major cities of the country. Test marketing of dried mango products was also carried out by a small facility in Tando Allahyar Sindh; and the results were very positive.

There is a demand for dried mango slices and also for mango leather. Mango leather can be made in different flavors by mixing different types of spices and other additives in the mango pulp.

3.2.2. Existing players

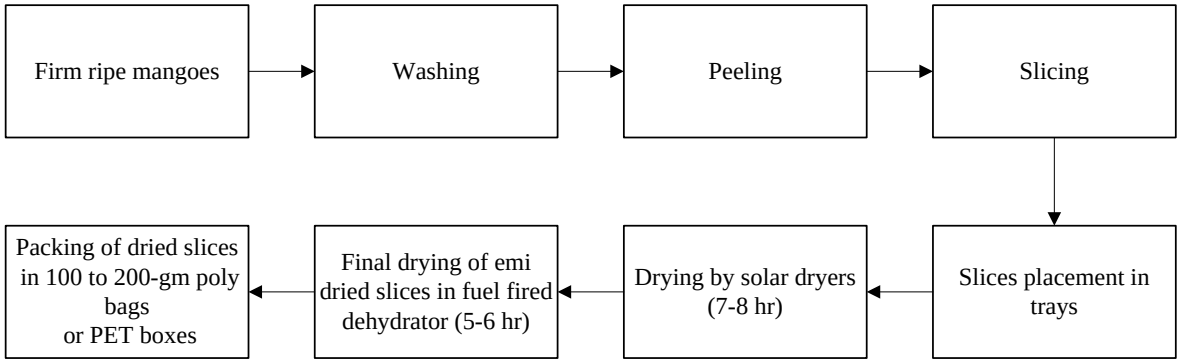
Pakistan is a large mango producer in the world. Almost all types of value added products of mango are made in Pakistan; including pulp, juice, drink, chutney, pickle, murabbas, etc. However, dried mango products are not made in Pakistan. There is only one research scale facility in Sindh which is engaged in making this product. The facility is situated in Nawazabad Farm in Tando Allahyar, Sindh. The facility was established and being used by a university in Germany. Researchers from that university use this facility for drying mango products. Absence of any

commercial facility for making dried mango products presents an attractive opportunity to small investors for earning good profits.

3.2.3. Project Description

3.2.3.1. Process Flow of Dried Mango

Process flow for making dried mango slices is presented below:



3.2.3.2. Project Cost

Machinery and Equipment

Machine/Equipment	No.	Unit cost RS	Total cost
Solar drier	1	500,000	500,000
Cabinet dehydrator	1	700,000	700,000
Stainless Steel top Slicing Tables	2	25,000	50,000
Slicer	3	5000	15,000
Stainless Steel Washing trough	2	15000	30,000
Knives, etc.	25	40	1,000
Total			**1,296,000**

Land and Building Requirement

0.25 acre land @ Rs 500,000 per acre	125,000
Building (700 sq. ft. @ construction cost of Rs 500 per sq. ft)	350,000
Total cost of land and building	**475,000**

Operational Cost (per day)

Inputs	Quantity	Cost (Rs)
Mango fruit @ Rs 20 per kg	700 kg	14,000
Worker deployed @ Rs 200 per day	12	2,400
Fuel (gas)		900
Electricity	1 KW x 8 hr	100
Total		**17,400**

Per unit cost comes out to be Rs 267 per kg of dried mango.

Revenues and Profits

Dried Mango sale price has been taken as Rs 500 per kg.

Total numbers of operational days for the project have been assumed as 60. At production rate of 65 kg per day, total production of dried mango will be 3,900 kg.

Total revenues	Rs 1,950,000
Total cost	Rs 1,041,300
Gross Profit	Rs 909,000

ANNEX A

Mango Processing Machinery List

Name of machine/equipment	No.	Origin
Feeding/sorting roller conveyor	1	Imported
Fruit washing system	1	Imported
Mango de-stoning machine	2	Imported
Chopping machine/hammer mill	1	Imported
Thermo break	1	Imported
Two stage refiner	1	Imported
Monix pumps	5	Imported
Sterilizer/Pasteurizer	1	Imported
Conveyor / elevators	1	Imported
Aseptic filling system	1	Imported
Peach /apricot de-stoning machine	1	Imported
Stainless steel tanks	4	Local
SS screw conveyer for waste removal	2	Local
Brushing machine	1	Local

ANNEX B

Mango Utility Equipment List

Description
Boiler (4 tons/hr, 150 psi)
Air Compressor
Water Chiller
Generator (250 KVA)
Cooling Tower
C.I.P System
Water Treatment
Fork Lifter (2.5 tons)
Deep well (0.5 cusec)
Weigh Bridge (60 ton)
Electric connection
Electrical wiring
Transformer
Effluent treatment
Waste hopper
Centrifugal pumps and pipes for water
Fuel gas connection

IMPORTANT CONTACTS

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