MANGO SEED OIL - Industry Profile

Mango is the third most important fruit crop of the country based on export volume and value next to banana and pineapple. It has established domestic market and has bright opportunities for the international market (fresh or processed form). The country’s export variety, the Carabao’ is one of the best varieties in the world.

- Since the major use of mango is the consumption of the sour-sweet pulp being eaten raw or for different kinds of food preparation and processes, the seed and the skin, which comprise 30% to 50% of the weight depending on the variety, are typically treated as waste and immediately disposed without further utilization (Philippine Mango Seedling Farm Corp. [date unknown]).
- In recent years, efforts have been made to find ways to utilize these wastes with acceptable economic and commercial feasibility. Peels and seeds can become sources of oils and other organic compounds for food, cosmetic, and alternative medicinal applications (Ashough and Gadallah 2011).
- Potential use of these by-products as sources of biodiesel for internal combustion engines.


HEALTH BENEFITS OF MANGO SEED
The mango kernel is rich in carbohydrates, fats, proteins, and minerals, some of its benefits are as follows:

- The kernel can also be used for extraction of edible oils and as a supplement to wheat flour.
- It is a potential antioxidant properties and high phenolic content of mango kernels and peel powders can help improve the nutritional quality and antioxidant properties of foods, such as biscuits.
- Its oil known as mango butter is a good alternative natural ingredient or additive in various body and skin care products such as lotions, sun protection creams, moisturizer, and soaps.


MARKET OPPORTUNITY

Growing sector of processed product

- Processed mango produce continue to grow relative to the fresh category in terms of quality and quantity.
- The residue of mango processing industries, the seed in particular, is not being utilized to its full commercial potential. With the increase in processed mango produce, raw materials (i.e. seed) are abundant.
- Mango seed oil can be turned into a high value product which can be used in the cosmetics industry.
INVESTMENT OPPORTUNITY

Global demand
- Up to 3% to 12% of mango kernel oil is generally used in manufacturing companies of mango-based lotions, creams, balms, soaps and hair conditioners.
- Oil is commercially extracted from the kernels in India and finds use as a cocoa butter substitute. The cake remaining after oil extraction is used in animal feed.
- Mango kernel oil is presently being developed for medicinal use and in preparation of food items like confectionery

PHILIPPINE ADVANTAGE

Raw Materials
- Mango seed from mango farms and processing plants
- Hexane
- Packaging material

Technology that support the industry
- Manufacturing
  - It needs to be mentioned that the raw materials are not available for the product to be manufactured on a round the year basis and hence, this should at best be a seasonal activity.
- Pre-Treatment
  - Mango stones have to be dried, usually in the sun, to reduce the kernel moisture content from about 48% to 13. After drying the stones are decorticated, usually by hand.
- Oil Extraction
  - In India, prior to oil extraction, the mango kernels are sieved to remove foreign matter and broken in a hammer mill. The broken kernels are further reduced in size by use of a roller breaker. The material is heated to soften it and finally fed to flaking rollers.
  - Oil is extracted from the mango kernels by solvent extraction process. The kernels are prepared to make it easy for the solvent to permeate the oil content. The prepared raw material is sprayed with hexane which dissolves the oil. The resulting solution is then distilled in a vacuum to separate the oil.

Plant, machinery & equipment
- Driers
- Decorticators
- Hammer mills
- Roller mills
- Solvent extraction plant
- Preparatory section equipment
- Main extraction plant
- Main finishing section equipment

Support industries/infrastructure
- Contract growing arrangement with farmers to ensure continuous supply of raw materials and maximize the volume of production as well as support farmers’ growth
- Availability of post harvest handling and storage facilities through the implementation of the Philippine National Cold Chain and Tramline Program by the Department of Agriculture
- Establishment of three cold chain facilities in three major producing areas: Benguet, Cebu, Bukidnon

Human resources
- The country being an agricultural country has many readily available plant workers.
- Man Power Requirement: 45

Supply
Cebu City is the Philippines’ center for mango production, both raw and processed products, the province generates about 75 tons of mango skin and seed wastes every month from the manufacturing of dried mango that is supplied both for the domestic and export markets.

Raw material suppliers

- **NCR**
  - Fruitgems Agricultural Corporation
  - Tem Ngun Food Corporation
  - Kian Sun International Corporation
  - Agrinurture, Inc. (formerly Mabuhay 2000 Enterprises, Inc.)
  - Cebu Legacy Marketing Corporation
  - A & P Foods Corporation
  - Harman Foods, Inc. Mango Juices
  - Ramed Food Manufacturing, Inc.
  - Soyuz Foods International Inc.
  - XTC, Incorporated
  - Hi-Las Marketing Corp.

- **Region 3**
  - Bulacan-Batangas Food Specialties
  - Agri-Fruit Freezing Corp.
  - Drupe Int'l. Inc.
Potential Manufacturers

Local

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<td>GV Cosmetics</td>
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<td>HBC Incorporated</td>
<td>Silk Skin Beauty Care Corp.</td>
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<td>International Pharmaceuticals Inc.</td>
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<td>Johnson &amp; Johnson Phils.</td>
<td>The Rogemson Co. Inc.</td>
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<td>Juvic Incorporated</td>
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<td>Lamoiyan Corporation</td>
<td>Vibelle Manufacturing Corp.</td>
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<td>Lean Processes Inc.</td>
<td>Vibrant Manufacturing Corp. Inc.</td>
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International

- JarChem Industries Inc. is a global supplier of emerging and unique specialty chemicals. Jarchem products have become fixtures in the cosmetics, pharmaceuticals, nutrition and food, adhesives and coatings, and polymers industries.
- California Mango Hand & Body Care Products are unique in the world of manicuring. Born as an overall hand & body treatment line, California Mango has achieved a high level of popularity by meeting the need for superior cleansing, moisturizing and exfoliating products. Combining nature's best essential oils & vitamins with the newest four phase manufacturing process for purity and consistency, California Mango is one of the few companies in the personal care industry that manufactures its own products.
- The list of cosmetic products below is a selection of the most requested cosmetics that contain the ingredient Mangifera Indica Seed Oil.

- **Alienor** Lippenstifte Mit Pflegewirkung
- **Aubrey Organics** Island Naturals Replenishing Shampoo
- **Body Shop** Shower Gel Mango
- **Clivia** Handcare Cremeseife
- **Dr. Hauschka** Aufbaumaske
Mango Oil Extraction Companies

Mango oil extraction technology is still under development and has not yet been launched in the Philippines. However, the following international companies are involved in the extraction, manufacture and distribution (*also in the Philippines) of mango seed oil:

- Aum Consultancy Pvt. Ltd (Chennai, India)
- BioChemica Internation, Inc. (Florida, USA)
- Enfield Agrobase Ltd. (Chennai, India)
- Jeen International Corporation (New Jersey, USA)*
- Manorama Industries Pvt. Ltd. (Chattisgarh, India)
- Nanjing Chemlin Chemical Co., Ltd (Mainland China)
- Oil Seed Extractions (Ashburton, New Zealand)
- Protameen Chemicals Inc. (USA)*
- Quadra Chemicals (Canada)

Source: Value Proposition for Mango Seed Oil, ISD-BOI June 2011

Reference:
Optimizing Microwave-assisted Crude Butter Extraction from Carabao Mango (Mangifera indica) Kernels by: Edgardo V. Casas University of the Philippines Los Baños
  Von Jansen G. Comedia University of the Philippines Los Baños
  Arni G. Gilbuena University of the Philippines Los Baños Ateneo de Manila University
  Kevin F. Yaptenco University of the Philippines Los Baños