Processing of Palm & Date Gur

INTRODUCTION

Best variety and class of Jaggery is only cultivated and found in India. Palms are vigorous, high production trees and their importance to tropical peoples cannot be understated. Some species, called Toddy Palms, have been tapped particularly for their sweet sap which is made into sugar and both alcoholic and non-alcoholic beverages. Their sweet fruit and young stems are also used. Gur or Jaggery is one of the famous processable items made of sap comes out from Date palm tree. Bengali people have a unique demand of such Gur, especially in winter season. Traditionally Gur is almost available to every Bengali's household.

Processable Items

The followings are processable items of Date Gur:

- Nolen Gurer Sondesh
- Joynagar Moya
- Badam/Chirer Moya or Khaja
- Patali Gur
- Natun Gur
- Rosogolla made of Gur etc.

Sources of Raw materials

Date Palm trees are grown almost everywhere. The climate or weather condition in West Bengal for growing Date Palm tree is in favour. Generally the method of obtaining this sap is to climb the tree, cut the end of the inflorescence (flower cluster) and hang a container from it to catch the sap that drips out. Rural villages of North & South24 Parganas, Murshidabad, Nadia, Malda are main areas of Date Palm tree.

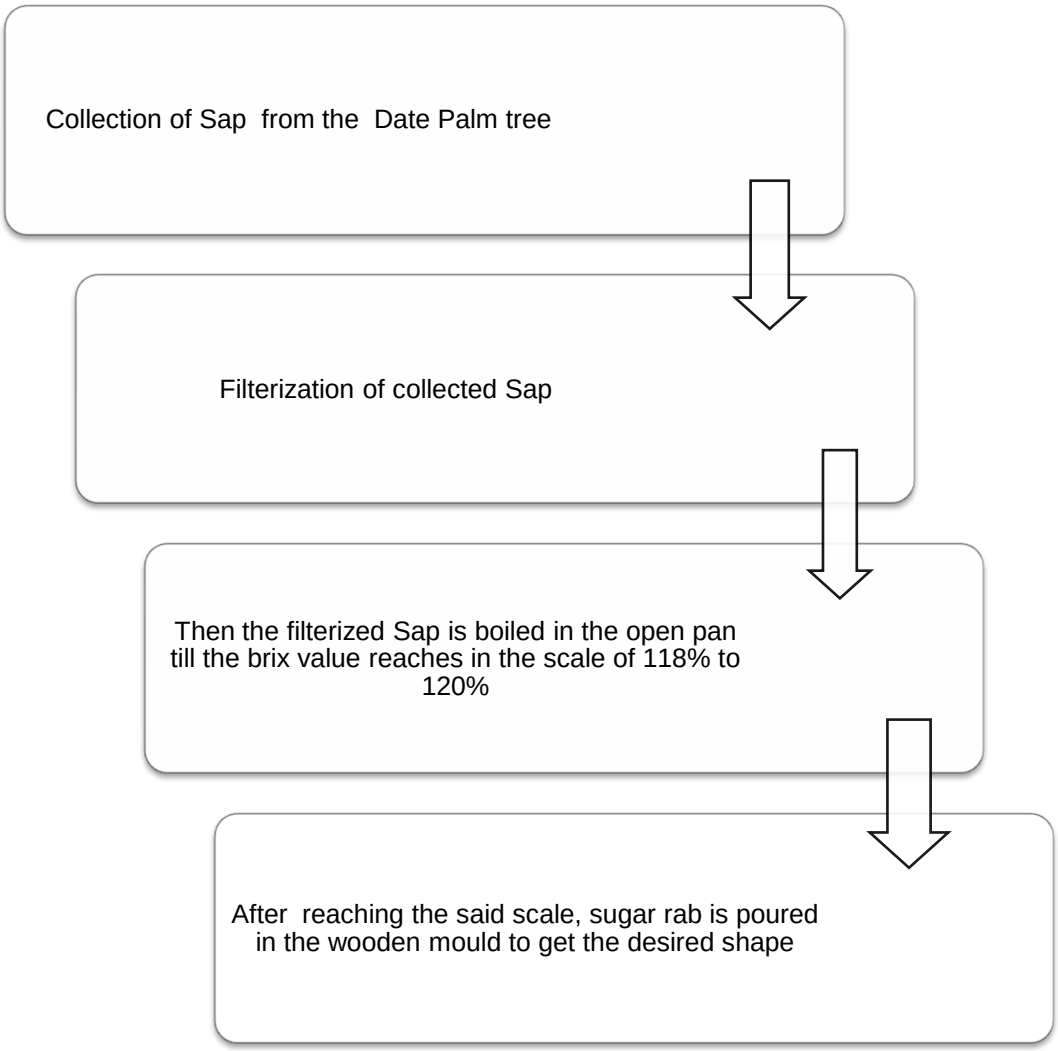
Drivers of Demand

Bengalies are the main drivers of demand for Gur. Sweets are already famous among Begalies and added flavor of Gur in sweets certainly nobody can ignore. A niche market is observed in West Bengal of Date Palm Gur. So the demand of Gur is mainly driven by all class of the people of the Bengali society.

Market Details

Jaggery or Gur has a traditional market in all over India and in West Bengal as well. In all confectionaries shops Gur made sweets are available and those are sold like hot cakes. The market is penetrated all over West Bengal. In the winter season the market of Gur goes high. There are numbers of Gur stalls are found during winter season where except from Gur other processable items are also sold.

FLOW CHART OF GUR PROCESSING



Cost of project

The up comers' entrepreneur who is looking for to set up Gur processing units, they can stick their decision. Demand of good quality Gur in West Bengal is there all the time.

Total project cost: 4.26 lacs

Land requirement: The land requirement for a unit set up would be around 500 sq. ft.

Sl.No.	Description	Cost (Rs in Lac)
1	**Equipment** : Rs. 200000.00 (Aluminum pan, tray, ladle, wooden Scraber, Stand , Filters, Buckets, cans and Heating Chambers with furnace and tools etc.)	2.00
2	Misc. Fixed Assets	0.50
3	Preliminary & Preoperative Expenses	0.20
4	Margin money for working capital	1.56
	Total Project Cost	**4.26**

Other than the above requirement raw materials, cost of labor and other variables are required to run a unit.

Note:
1. All figures mentioned above are only indicative and may vary from place to place.
2. If the investment on Building is replaced by Rental Premises-
(a) Total Cost of Project will be reduced.
(b) Profitability will be increased.
(c) Interest on Capital Expenditure will be reduced.

Available technology

- Central Food Technological Research Institute (CFTRI) can be worked as a source of technology advancement.
- National Research Development Corporation (NRDC) can serve to the units in respect of technological know-how.

Sources of machineries

The Gur processing equipments are availble from any local market.

Domestic and export market suppliers

- **GAYATRI INTERNATIONAL TRADING CO**

  Address: F - 20, A.P.M.C, Market - Ii, Dana Bandar, Sector - 19, Vashi, Navi Mumbai - 400703, Maharashtra, India

  Contact number :+(91)-9892559169

- **TAJ AGRO INTERNATIONAL**

  Address: 434, Laxmi Plaza, Laxmi Industrial Estate, New Link Road, Andheri (W) Mumbai- 400 053.India.

  Contact number: Cell No: 009930407744
  Phone: 91-(0)22-26322701
  Fax: 91-(0)22-26322167

- **P. J. FOODS COMPANY**

  Address: Jaina Estate, Crpf Gate, Jwala Nagar, Rampur - 244901, Uttar Pradesh, India

ROLE OF SCIENCE & TECHNOLOGY FOR NEW FOOD PRODUCTS

INTODUCTION

Scientific and technical achievements applied throughout the food system, from agriculture and food manufacturing to preparation in the home. It has freed most people in the developed world from subsistence farming and full-time home food preparation, and allowed ready access to a diverse, abundant supply of food that is safer, tastier, nutritious, convenient, and relatively inexpensive than would otherwise be the case. Using science and technology food quality can be maintained or even improved, and food safety can be enhanced. Sensitive nutrients can be preserved, important vitamins and minerals can be added, toxins and anti nutrients can be removed. Foods can be designed to optimize health and reduce the risk of disease (for example, sugar-free foods sweetened with an alternative sweetener for people with diabetes).

Drying, canning, chemical preservation, refrigeration (including chilling and freezing), and nutrient conservation and fortification were the significant advances of the 19th and 20th centuries and permitted population growth in more developed countries. Advances in agriculture and food science and technology have led to reduction in nutrient deficiency-related diseases; a generally safe food supply with consistent high quality available independent of seasons; food choices that do not require preparation time; a wide range of delicious foods; reduced food waste; lower household food costs than ever before; convenience foods requiring much less preparation time than before, a benefit for working families; and efficient global food distribution that can be exploited in times of disasters.

REQUIREMENT OF SCIENCE & TECHNOLOGY IN FOOD SECTOR

During the 2009 World Summit on Food Security, it was recognized that by 2050 food production must increase by about 70% which is 34% higher than it is today—to feed the anticipated 9 billion people. This projected population increase is expected to involve an additional annual consumption of nearly 1 billion metric tons of cereals for food and feed and 200 million metric tons of meat.

Another challenge is the large, growing food security gap in certain places around the world. As much as half of the food grown and harvested in underdeveloped and developing countries never gets consumed, partly because proper handling, processing, packaging, and distribution methods are lacking. Starvation and nutritional deficiencies in vitamins, minerals, protein, and calories are still prevalent in all regions of the world.

As a consequence, science-based improvements in agricultural production, food science and technology, and food distribution systems are critically important to decreasing this gap. Although scientific and technological achievements in the 20th century made it possible to solve nutritional deficiencies, address food safety and quality, and feed nearly 7 billion people, further advancements are needed to resolve the challenges of sustainably feeding the growing future population in industrialized and developing nations alike. In fact, to meet the food needs of the future, it is critically

important that scientific and technological advancements be accelerated and applied in both the agricultural and the food manufacturing sectors.

VARIOUS FOOD TECHNOLOGIES, PROCESSES & OPERATIONS

The mechanical operations, processes, and technologies typically used in preparing and using raw materials in manufacturing foods and beverages are briefly described below:

Heating:

By increasing the temperature to appropriate levels and holding for an appropriate time that is dependent on both the nature of the food and the objective of the process, pathogenic or spoilage microorganisms are significantly decreased in number or eliminated. There are basically 3 types of heat processes that are applied to food, other than cooking: *blanching*, *pasteurization*, and *canning*.

Blanching is a mild heat treatment (usually accomplished at temperatures below 212◦F for less than 2 to 3 min) applied to foods that are to be subsequently canned, frozen, or dried. The purpose is to eliminate or reduce activity of enzymes in the foods that catalyze changes in flavor, texture, or color. Other benefits include removal of air from the food tissue to reduce oxidation, softening of the plant tissue to facilitate packing into packages, and inactivation of antinutritional properties.

Pasteurization is most generally applied to liquids, although it is also applied to semisolid and solid foods. As applied to liquids, the temperature is elevated to 140 to 212◦F for a short period of time (usually less than 1 min) to inactivate microorganisms that can cause illness. Pasteurization is most well known for its application to milk. Most pasteurized foods are subsequently kept in refrigerated storage to extend the shelf life because not all spoilage organisms present have been inactivated.

Canning is primarily used to inactivate microorganisms that cause food-borne disease such as botulism, but it also inactivates microorganisms that cause food spoilage. This thermal process is commonly accomplished by holding the product at temperatures well above 230◦F for several minutes. Canned food is not absolutely sterile (devoid of all viable microorganisms) but rather is commercially sterile (devoid of all viable microorganisms that could grow under normal storage conditions).

There are 2 major methods: heating the food after it has been sealed in a container (referred to as *canning*) and sterilizing the food, then depositing it in a sterile container within a sterile environment and sealing the container (referred to as *aseptic processing*). These processes can also be optimized for retention of nutrients and quality factors such as taste, flavor, and color.

Refrigeration and Freezing:

The use of ice to reduce the temperature of foods and prevent spoilage has been recognized for centuries. Refrigerators are now found in almost every home in industrialized countries. Although the reduction of temperature does not eliminate microbial populations, it reduces the rate of microbial growth enough to prevent product spoilage and extend the shelf life of most food products. Most fruits and vegetables are refrigerated to extend their freshness. In addition, refrigeration also reduces the reaction rates of enzymes that cause deterioration of most quality attributes of a food or beverage, making high-quality products available to the consumer for extended periods of time.

Freezing is a more intense use of refrigeration to reduce the temperature of a product to levels below the freezing temperature of water in the product. Lower temperatures cause the liquid water to change phase to ice. At these reduced temperatures (−0.4 to −14◦F), the deterioration rates for product quality attributes are reduced to below those at refrigeration temperature, and microbial growth is reduced to negligible levels.

Dehydration:

Drying is intended to halt or slow the growth of microorganisms and rate of chemical reactions. The removal of water provides food processors excellent opportunities to reduce volume and weight, extend shelf life, and convert liquids to powdery products. Many types of dryers, dehydration methods, and associated equipment are applied to a very wide range of foods. Sun drying on trays, mats, or platforms is the traditional method and is still used today. Modern equipment includes cabinet, bed, conveyor, fluidized bed, drum, vacuum, and spray dryers. Freeze drying (lyophilization), osmotic dehydration, microwave, and innovative light-driven refractance-window dryers are also in use. With continuous technological advances in different fields, drying is constantly evolving to offer better quality and novel products.

Acidification:

Raw foods and beverages vary significantly in levels of acid they contain. Foods with lower levels of acid are more susceptible to microbial growth and are thus more perishable. This approach to preservation is based on the inability of many spoilage microorganisms and pathogens to grow at high levels of acid. Increasing the acidity prevents growth of many microorganisms and extends the shelf life of the product, while maintaining many of its attributes. This preservation method can be accomplished by addition of acid to adjust the overall acidity level of the product, or biologically through fermentation. Since acid alone may not be sufficient to fully protect the product, adjustments in acidity are frequently used in combination with other techniques such as heat, additives, or refrigeration to accomplish preservation and safety.

Smoking:

The application of smoke to food products, primarily meats, is a very traditional process. Smoke helps to reduce the spoilage of perishable food products such as meat and also imparts a very distinctive, desirable flavor. Over time, the smoke process was expanded to include not only meat, fish, and poultry but also, more recently, sausage products, ham, bacon, cheeses, and many other foods for which a unique smoked flavor and increased shelf life are desired. Smoke achieves 4 different functions when applied to food, all of which contribute to safer, more palatable products: Food safety, Flavor and aroma, visual appeal and preservation.

Irradiation:

For more than 40 years, ionizing radiation has been used commercially to destroy bacterial and insect contamination of food. Common sources of ionizing radiation today are electron beams, X-rays, and, more often, gamma rays. Irradiation is particularly effective in reducing microbial contamination of hamburger meat and poultry, which can be contaminated by pathogens such as *E coli*, *Salmonella*, and *Campylobacter* and result in food-borne illness. Irradiation also may be applied to eliminate

insects in a wide variety of foods, for example, flour, spices, fruits, vegetables, and grains, to prevent seeds from sprouting, and to control pathogens in fresh shell eggs, seeds for sprouting, fresh or frozen molluscan shellfish (for example, oysters, clams, mussels, and scallops), and fresh iceberg lettuce and fresh spinach. Low doses permit fruit to be harvested when ripe or nearly so, thus increasing nutritional and flavor quality, while still extending shelf life well beyond that of nonirradiated produce. Low doses of irradiation can achieve sprout inhibition and insect de-infestation; medium doses are required for reduction of spoilage and pathogenic bacteria; and high doses are required for sterilization.

The food industry has been slow to adopt food irradiation in the more developed nations because of the large capital investment required; there is little incentive to invest in irradiation equipment because of funds already allocated for refrigeration, canning, and other major processes. The situation is very different in developing areas, where existing processes are much less extensive and postharvest losses and the risks of food borne illness are far greater. Some argue that this is where the need for irradiation is greatest and the ability to afford it is the lowest.

Extrusion:

This process pushes a material through a specially engineered opening to give a desired shape and texture through increases in temperature, pressure, and shear forces. The pushing force is applied by using either a piston or a screw. In food applications, screw extrusion is predominant. Examples of traditional extruded foods are pasta, noodles, vermicelli, and breakfast cereals. Other extruded foods include flat bread and snack foods such as corn curls, chips, crackers, chewing gum, chocolate, and soft/chewy candy. Extrusion is also used to create flavors and encapsulate them for heat stability in processing. Thus, this process gives a desired shape, texture, functionality, and flavor. Food extrusion is generally considered a high-temperature, short-time (HTST) process. The food components are exposed to temperatures above 284◦F for a very short time, generally a few seconds. A combination of higher temperature and shorter time is desirable because it retains nutrients better than a combination of lower temperature and longer time. Extrusion is an environmentally friendly process that uses heat and power efficiently and does not produce effluents. In addition, the same equipment can be used to make a variety of products. Extruded products are safe to consume, with no known harmful effects.

Additives:

Food additives are adjuncts to food processing. They extend the range and flexibility of the relatively few food processes available, and they improve the economics of the processes. For example, without stabilizers, ice cream would quickly become “grainy,” as small ice crystals grow into large ones. Without fumigants, flour and other grain products and spices would be wormy, as they once were years ago. Without fortification of milk and flour and the addition of iodine to salt, rickets and goiter would still occur. Without artificial colors, many foods, such as gelatin, would be unattractive because natural colors lack the stability and coloring power of the synthetics.

Packaging:

Many different types of food packages are used for several different reasons. Food is packaged primarily to contain the product, protect the product from contamination, enable convenience, and

provide information. Most food products are delivered to the consumer in some type of package. Foods that have received some type of preservation process are placed in a package to ensure that the product attributes enhanced by the process are maintained. Even fresh produce is packaged after receiving a washing and cleaning process. Packaging offers a critical component of food safety by preventing contamination from pathogens. In addition, packaging extends the shelf life of the product by providing a physical barrier to or protection from atmospheric oxygen and moisture, light, and other agents that would accelerate deterioration of the product. Finally, packaging is the vehicle by which legally required information is presented to the consumer in the form of the label bearing information about the product identity, quantity, ingredients, nutrient content, expiration date, and commercial source.

Aseptic packaging is a major area of food packaging that has significantly increased the safety, quality, availability, and convenience of certain foods around the world, while reducing the amount of energy needed to preserve and store such foods. The major difference between aseptic packaging and traditional methods of food packaging is that in aseptic packaging the product and the packaging material are continuously sterilized separately. Then, under aseptic conditions that prevent recontamination of the product, the sterile package is filled with the cooled sterile product and hermetically sealed to produce a shelf-stable final product with extended shelf life and no need for refrigerated storage. This technique has allowed for substantial improvements in the quality of the final product, mainly due to the much milder heat treatment that the product undergoes compared to the traditional thermal process. Large-scale aseptic bulk processing and packaging, combined with aseptic storage and transportation, contributes significantly to reduction of postharvest fruit and vegetable losses and greater availability of these food products around the world.

EMERGING PROCESSES

To meet consumers' growing demands for fresh-like and highly nutritious foods with guaranteed safety, several alternative preservation technologies have been developed during the past 15 to 25 y for application to food products. These technologies include both (1) novel thermal processes such as microwave and ohmic heating, which are much faster than the currently widespread canning method to produce shelf-stable foods and (2) other physical methods that do not use heat as a primary mode of inactivating microorganisms in foods, such as ultra-high pressure (UHP), pulsed electric fields, ultrasonic waves, high-intensity pulsed light, and others. Each of these alternative technologies has unique characteristics and potential for expanded applications in different categories of food products. The goal of all the new processes is to reduce the overall time and temperature exposures of the foods so that they are safe and more like fresh or freshly cooked items. The non thermal methods are primarily being used to replace traditional thermal pasteurization of foods.

Ohmic Heating:

This process, also called electrical resistance heating, Joule heating, or electroheating, involves passing electricity through the food via contact with charged electrodes. The electrical energy results in rapid, uniform heating, in contrast to the slow conduction and convection heating of conventional thermal processing, thereby allowing for greater quality than canned counterparts. It is particularly

useful for heat-sensitive proteinaceous foods. Ohmic heating has been applied in limited situations to such foods as cut and whole fruit and liquid eggs, but applications may expand to soups and similar items in the future.

High-Pressure Processing:

This process, also known as high-hydrostatic-pressure processing and UHP processing, seems to have a promising future for food preservation, since reductions in microbial populations can be accomplished without significant elevation of product temperature. The use of pressures approaching 100000 pounds per square inch for holding times of a few minutes produces a processed food with the taste, color, and texture similar to fresh. Following the successful introduction of a pressure-treated guacamole product in 1997, a growing number of ready-to-eat meats and other refrigerated items, including raw oysters, have been treated by high pressure to meet food safety standards for such products and have increased their high-quality shelf life.

Pulsed Electric Fields:

Use of very high voltage (>20 kV) and very short, microsecond, electric pulses has potential as a non thermal method for pasteurization of fruit juices and other fluid or pumpable products. The process is being optimized, but more information needs to be evaluated on the impact of the process on food components, first to assure microbiological safety and then to determine the impact on sensory quality as well as content of key nutrients.

Recent research has shown not only that some of these alternative novel processes allow production of very high quality items, but also that those items may have a higher nutritive value than similar items produced by traditional thermal processes because the novel processes result in less chemical damage of key micronutrients. To achieve acceptance first by the regulatory authorities and then by consumers will require an overall evaluation of each of these novel processes.

CONCLUSION

Our modern food system is very complex and changes continuously in time and space. During the past century, food processing evolved to make food the basis of a healthy civilization, help society overcome hunger and disease, and improve the safety, nutrition, convenience, affordability, and availability of foods. Food processing also changed the perception of foods and beverages. Today and in the future, the food system must be flexible and resilient, consumer driven, and sustainable, and it must secure the environment and natural resources and assure the health and wellness of an increasing number of consumers. Food science and technology can help us advance the food system, minimize risks, maximize benefits, and deliver a safe, nutritious, and abundant food supply to all people around the world.

TRADITIONAL & ETHNIC FOOD PROCESSING UNITS

INTRODUCTION

Bengalis are well passionate about their tradition in all part of their life. Even in food they are concern about the traditionalism. They prefer ethnic and traditional food out of which Morobba, Moya, Gohana Bori, Til khaja, Tal gur all are in the different dignity to Bengalis.

Traditional and Ethnic Food items:

- Moya
- Morobba
- Gohana Bori
- Khaja (Till, Badam, Chira)
- Tal gur
- Aam satta
- Different traditional sweets
- Sonpapri
- Pickles
- Papad
- Dry Fish

Drivers of Demand:

Food has always been a weakness for the Bengalis. Demand of traditional and ethnic food items is always prevail in the market. Traditional and ethnic foods are sold in different places like in confectionaries shop, train, Bus, Van and in many more places. The people belong to different society and class never fails to pick up at least one item from the seller. So the demand of those traditional items is perennial.

Market Details:

As the demand of traditional food products are very high so the markets of those products always go high. These markets are penetrated all over West Bengal. There are numbers of traditional food stalls are found during different time of a year. In the district side special stalls are found for traditional food items like Joynagarer Moya Stalls, Jaggery stalls, Khaja stalls etc. Those products are sold in different type of Melas (Fair) also. The market of traditional food products is penetrated all over India. In West Bengal the markets are generally venture type, most of the stalls do not stay round the year. There is some specific time or season on which the traditional foods are available in those stalls.

Detailed Analysis on processing of Traditional and Ethnic Food

Methods of Moya Processing

At first the Sugar mixed with molasses (Nalane) is boiled. Thereafter the boiled mixture is handled again and again by wooden spoon till it becomes cool and thereafter the "Kankanchur Paddy" is mixed with the mixture slowly in a specified manner. After that, to dry the mixture fanning is necessary.

Tow labors are busy with preparing Moya

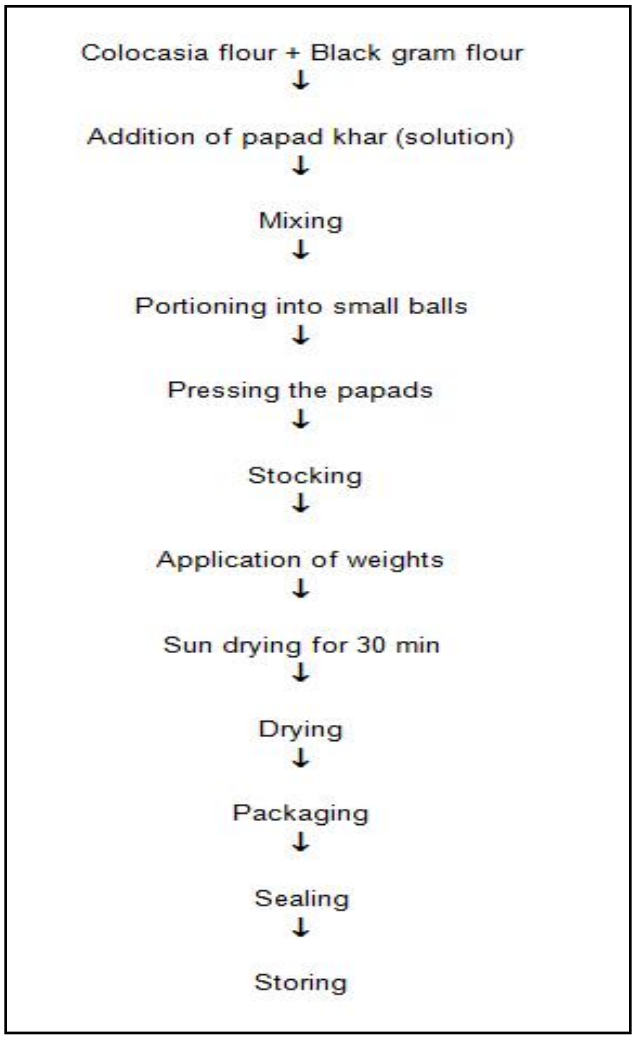
After fanning, the sweet scented "Nalane" molasses is poured on it and the entire materials is covered. After some time, the materials are mixed with Ghee & Cardamon. Thereafter the 'Moya' is prepared in round shape of different sizes by hand and displayed in row in an order in a tray. At the time when the 'Moya' is rounded up by hand, he hand is often touched with Ghee and Warm Water.

Methods of Papad Processing

Papads are also made by papad press developed by CFTRI. It is a simple leg operated machine and toggle mechanism is used to develop high pressure with least effort. Generally weighed quantity of floor is taken in a mixer. A solution of common salt and carbonates is added in requisite quantity of water and the contents are kneaded at maximum speed to get a homogenous lump of the dough. After resting the dough for 30 minutes, it is divided into balls. These are pressed into circular discs. Corn starch can be

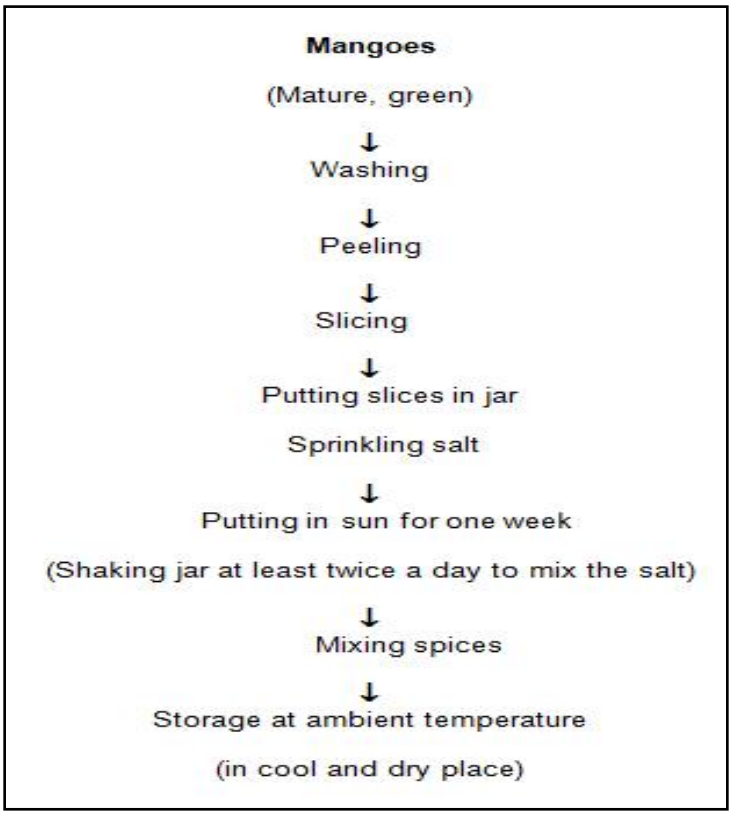
used as dusting material to prevent stickiness. The papads are usually dried. Papads are made both in conventional way and also by press depending on production level. The quality specification of papads is IS: 2839.

Flow Chart of Papad Processing:



Flow chart of Mango pickle processing from Mango

Mango (peeled and sliced) -1 kg, salt - 200 g, red chilli powder 10 g, asafetida -5 g, fenugreek, black pepper, cardamom (large), cumin and cinnamon (powdered) each 10 g, clove (headless) 6 numbers.



Flow chart of Amsatto (Mango bar) processing from Mango

1. First wash the mangoes and peel the mangoes.

2. Cut flesh of mango and blend.

3. Boil the puree with bay leaf and cinnamon and when it is on boiling point turn off the heat.

4. Take your tray and put baking paper over that.

5. Spread thin layer of the puree over the paper.

6. Get it dry under the sun and when it is dry and spread another layer on that.

7. Put under the sun again. In this way use all of the puree and make thick or thin your homemade mango bar/amsotto.

8. Store it in cool dry container and taste the mango in off season.

Flow chart of Dry Fish Processing

This is a culinary style originating in Bengal, [a region in the eastern South_Asia which is now divided between the Bangladesh and the West_Bengal. With an emphasis on sweet water fish, vegetables and lentils served with rice as a staple diet. Bengali cuisine is known for its subtle (yet sometimes different) flavours, and its huge spread of confectioneries and desserts. It also has perhaps the only traditionally fully developed multi-course tradition from South_Asia that is analogous in structure to the modern style of formed cuisine (in three course meal), with food served course-wise rather than all at once like other Asian food culture.

Dry fish is described as any fishes which had developed a strong odour within hours of capture and salted for about four days and then dried. The fish most commonly dried and salted are cod, herring, mackerel, and haddock. Smoking preserves fish by drying, by deposition of creosote ingredients and when the fish are near the source of heat, by heat penetration.

Cost of Project

The entrepreneurs who are intending to invest less and earn more, the idea of setting up food units on traditional and ethnic products will run very well. A detail project report is showing below:

Total project cost: 0.935

Land requirement: The land requirement for a unit set up would be around 500 sq. ft.

Sl.No.	Description	Cost (Rs in Lac)
1	**Equipment**: Grinder, pounding machine, packing machine, labeling machine, utensils, electrifications, iron racks, storage jars	0.46
2	Misc. Fixed Assets	0.46
3	Preliminary & Preoperative Expenses	0.015
4	Margin money for working capital	0.46
	Total Project Cost	**0.935**

Availability of different Traditional food in West Bengal:

- Moya one of the traditional foods in West Bengal is mostly prepare in South 24 pargana in Joynagar.
- Jaggery or Date Gur is also famous in South 24 parganas, North 24 parganas, Malda, Murshidabad etc.
- Gohana Bori is found in Tamluk, Purba Medinipur.
- Dry fish is mostly available in Diamond Harbour South 24 parganas, Digha Purba Medinipur and other fish producing areas.