



PM Formalisation of Micro Food Processing Enterprises Scheme

Processing of Tapioca Chips



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CHAPTER 1

INTRODUCTION

1.1 ORIGIN, DISTRIBUTION OF TAPIOCA/CASSAVA

Cassava has many names across many continents. The English word is **cassava**, but in South American in the area around Brazil it is called **madioca**. In Africa where French is spoken it is called **manioc**. In Spanish-speaking countries it is called **yuca**. Here in Asia we call it **tapioca**. The origins of cassava are many, but the principal origin is in the tropical areas of the American continents, especially in South America. The countries such as Guatemala, Mexico, Peru, and Honduras planted cassava three to five thousand years before the plant was distributed across the Americas and elsewhere. In the 15th century, slave traders and the Portuguese brought cassava to the African continent. Cassava (*Manihot esculenta* Crantz) is considered as the king of tropical tuber crops as it occupies a significant position in the global agricultural economy and trade amongst the tuber crops. Cassava is the most important starchy root crop grown in the tropics and is mainly cultivated in southern peninsular India. Introduced during seventeenth century by Portuguese, the crop played a significant role to overcome food shortage among the low income group of people in Kerala. Underground tuber is rich in starch and mainly consumed after cooking. Processed products like chips, sago and vermicelli made of tapioca are also popular in the country. Being easily digestible, it forms an important ingredient in poultry and cattle-feeds. It is also widely used for production of industrial alcohol, starch and glucose (Lakshmi et al. 2000).

Cassava is known to be originated from North-Eastern Brazil. Portuguese distributed the crop from Brazil to countries like Indonesia, Singapore, Malaysia and India. The stem is woody and variously branched. Two distinct types are present - one without branching at the top and the other with spreading nature (Srinivas et al. 2005). Nigeria is the major growing country in world accounting for 50% of area and production. In India crop is cultivated in southern peninsular region, particularly Kerala, Tamil Nadu and Andhra Pradesh contributing 93 % of area and 98 %

of production in the Cassava reached Asia around the 17th century, when the Spanish brought it from Mexico for planting in Philippines. In the 18th century, the Dutch brought cassava into Indonesia. No matter how many tens of hundreds of names cassava may have, the importance is that it is a cash crop that generates a tremendous amount of revenue for Thailand. Thailand is currently the largest producer and exporter of tapioca flour in the world. Cassava was first commercially planted in the South of Thailand, where it was planted between rows of natural rubber trees. Much of it is planted in the province of Songkhla, so many factories were established there to produce tapioca starch and tapioca pearl for export to Singapore and Malaysia. However, the amount of planted cassava gradually decreased due to the encroachment of the rubber trees as they fully grew. Planting area was then shifted to the East, such as Chonburi and Rayong. As market demand increased, planting area extended to other provinces, especially in the Northeast. The cassava plant has either red or green branches with blue spindles on them. The root of the green-branched variant requires treatment to remove linamarin, a cyanogenic glycoside occurring naturally in the plant, which otherwise may be converted into cyanide. Konzo (also called mantakassa) is a paralytic disease associated with several weeks of almost exclusive consumption of insufficiently processed bitter cassava. In the north and northeast of Brazil, traditional community-based production of tapioca is a by-product of manioc flour production from cassava roots. In this process, the manioc (after treatment to remove toxicity) is ground to a pulp with a small hand- or diesel-powered mill. This masa is then squeezed to dry it out. The wet masa is placed in a long-woven tube called a tipiti. The top of the tube is secured while a large branch or lever is inserted into a loop at the bottom and used to stretch the entire implement vertically, squeezing a starch-rich liquid out through the weave and ends. This liquid is collected and the (microscopic) starch grains in it are allowed to settle to the bottom of the container. The supernatant liquid is then poured off, leaving behind a wet starch sediment that needs to be dried and results in the fine-grained tapioca starch powder similar in appearance to corn starch. Commercially, the starch is processed into several forms: hot soluble powder, meal, pre-cooked fine/coarse flakes, rectangular sticks, and spherical "pearls". Pearls are the most widely available shape; sizes range from about 1 mm to 8 mm in diameter, with 2–3 mm being the most common. Cassava is an important crop in terms of food security and income generation in the tropics (Legg et al. 2014). Nigeria is having the largest area under cassava (22.25 %) among all the cassava growing countries in the world with an annual output of 38.18 Million Tonnes. Congo Dem. Rep. occupies second position in cassava area producing 10

% of the world production. Brazil occupies the third position in terms of area and second rank in terms of production in the world (Edison et al. 1999)

1.2 IMPORTANCE & USES:

Tapioca have an abundance of health benefits, let us take a look at them below.

CONSTITUENTS AND HEALTH BENEFITS OF TAPIOCA

Tapioca also have many potential health benefits.

Health benefits:

1. Helps in Weight Gain: Tapioca is a vegetarian food and a rich source of the purest and simplest forms of carbohydrates and starches. This aids in building essential fat tissues to protect internal organs, as well as ensures uniform lipid distribution across the body and is hence very useful for those who are underweight.

2. Ideal for Restricted Diets: Being naturally gluten-free, nut-free and grain-free, tapioca is a perfect ingredient that can be routinely added in the diet of people suffering from food allergies and gluten sensitivity. Gluten is a protein intrinsically present in some whole grains such as wheat, barley and rye which triggers a severe reaction in some people whose bodies are averse to this component

3. Promotes Strong Muscle Growth: Tapioca abounds in essential amino acids and is a good source of vegetarian protein, both of which are crucial for many enzymatic reactions in cells and tissues in the body, to maintain proper functioning of all the organs. Moreover, it adds muscle mass and improves the tensile strength of connective tissues, thereby fostering muscular development.

4. Regulates Proper Digestive Function: As tapioca is an unprocessed food, the simple sugars and starches it contains will promptly be assimilated in the body and broken down in the stomach, to provide a source of energy. Furthermore, tapioca also helps in eliminating blockages in the gut passage upon digestion and hence prevents constipation and irritable bowel syndrome.

5. Combats Neural Tube Defects: Tapioca can be taken by expecting mothers, as it has profuse amounts of folate, that plays a vital role in the normal development of the foetus, avoiding any chances of neural tube defects and other birth abnormalities in the newborn. Folate also enhances red blood cell synthesis, required for transporting nutrients to vital organs in the body.

Nutritional value: One medium baked tapioca (173 grams), including the skin, provides:

- **Calories:** 358
- **Fat:** 0 grams
- **Protein:** 0.2 grams
- **Total Carbs:** 36.6 grams
- **Dietary Fiber:** 0.9 grams
- **Sugar:** 3.4 g
- **Calcium:** 20 mg, 2 % of Daily value
- **Iron:** 1.58 mg, 9 % of Daily value
- **Potassium:** 11 mg,
- **Magnesium:** 1 mg
- **Phosphorus:** 7 mg
- **Sodium:** 1 mg

Cassava tubers have low protein content (0.7% to 1.3% fresh weight (Ngiki et al., 2014)). The protein content of cassava flour, peels and leaves is also low at approximately 3.6%, 5.5% and 21% respectively (Iyayi and Losel, 2001). The protein content of cassava could be improved by addition of protein sources into the diet, or alternatively fermenting the cassava prior to adding it into the diet. Antai and Mbongo (1994) found that fermenting cassava peels using pure cultures of *Saccharomyces cerevisiae* increased protein content from 2.4% in non-fermented cassava to 14.1% in fermented products.

Lipid content

Cassava is very low in lipids containing about 0.1% lipids, compared with maize which has approximately 6%. Hudson and Ogunsua (1974) found that flour from cassava roots contains approximately 2.5% lipids, but only half of this is extractable with conventional solvent systems, and the fatty acids in cassava are primarily saturated. It had low levels of vitamin A, B1, B2 and niacin but high levels of vitamin C.

Carbohydrate content

Cassava contains highly digestible starch compared cassava starch to maize starch and found that cassava starch contains 17% amylose and 83% amylopectin, compared with maize starch which has 28% amylose and 72% amylopectin. The comparatively higher amylopectin level means that the digestible starch may be higher in cassava compared with other common starch sources fed to poultry. Resistant starch refers to starch and starch degradation products that escape digestion in the small intestine. Cassava chips contain approximately 40.91% resistant starch compared with maize which has 47.55% (Promthong et al., 2005), and raw cassava contains approximately 75.38% resistant starch (Onyango et al., 2006). Amylose becomes a resistant starch by crystallisation, as a result of chain elongation by double helical formation between amylose molecules. These elongated chains become folded and form tightly packed structures which are stabilised by hydrogen bonds.

1.3 VALUE ADDED PRODUCTS FROM TAPIOCA:

Tapioca is a starchy, granular foodstuff prepared from tapioca roots and used as a vegetable, in bread or as a thickening agent in liquid foods, notably puddings. 'Tapioca' is a Brazilian word, which translates as 'juice of tapioca'. In processing, heat ruptures the starch grains, converting them to small, irregular masses that are further baked into flake tapioca. A pellet form, known as pearl tapioca, is made by forcing the moist starch through sieves. Granulated tapioca, marketed in various-sized grains and sometimes called 'manioca,' is produced by grinding flake tapioca. When cooked, tapioca swells into a pale, translucent jelly. Tuber crops (with 5.4 % energy) are the second most important group of crop plants providing food energy to humans after cereals (49%). Of them, the tropical tuber crops (TTCs) contribute 3.9 % of human energy for an average consumption of 28.6 kg per capita per year (76 kcal per capita per day). Three of the

TTCs - cassava, sweet potato and yam - rank among the top 15 crop plants of the world in area under cultivation. Cassava and yams are presently among the major crops that show the highest rates of increase in area under cultivation. This may be attributed to their resilience to climate changes (Nayar, 2014). They are widely grown and consumed as staple food in many part of Africa, Latin America, the pacific island and Asia. Fig.2.1 shows the production of different tuber crops in the world under different continent level (FAOSTAT, 2017). Although china is the largest producer of sweet potato, accounting for more than 80% of the world supply, only 40% of the production is used for human consumption and industrial uses, while the rest goes as animal feed. In India, tuber crops are cultivated mainly in the southern, Eastern and North-Eastern states, where they play a vital role in alleviating the hunger of a majority a majority of population. Cassava and sweet potato are still the major tuber crops of India and cassava production is concentrated mainly in the southern states of Kerala, Tamil Nadu, and Andhra Pradesh. This is mainly used as a food or feed in Kerala, while almost exclusively an industrial crop in the other two states (Rawel *et al.* 2003).

The tapioca has been widely grown and consumed in the country. A variety of processed products can be achieved that enhances the market value, marketability, and desirability of the product. Since the tapiocas are mostly water (about 78%) and the solids present are also mostly indigestible (60-80%), processing like boiling, baking, microwaving, frying i.e., processes involving heat that breaks down the starch are performed prior to consumption. Tapiocas are eaten like tapioca chips, baked, boiled, mashed, sago and using flour to make a cake, pancake, etc. Cooked or processed tapiocas are more digestible than raw tapiocas since raw tapiocas contain starch in β -crystalline structure that is resistant to amylase digestion. Due to the loss of water-soluble vitamins and minerals, tapiocas are preferred not to be peeled or cut during boiling where maximum loss is recorded as compared to other processing like baking, roasting, and frying.

There is also a lot of opportunities, in value addition, that remain underexploited. This is partly because of little production of processor.

1. Tapioca crisps: Crisps have been dubbed as the “King of Snack Food.” Now, there are already many companies or factories that make crisps.

2. Factory-made chips: It involves processes of washing, sorting, pressuring, slicing and freezing. A consumer would only need to boil the pack of chips, picked from a supermarket shelf, to reminisce the simpler days.
3. Sago: Sago (Saboodana) is a processed edible starch produced from tapioca starch marketed in the form of small globules or pearls. Sago is a traditional, convenient and ready to cook food consumed in many parts of the India. Sago production is carried out by many small scale industries
4. Canned tapiocas: Tapiocas are canned after undergoing pressure cooking to sort of sterilize them. Canning is also a great win for kitchens because the potatoes are bought half-ready for serving.
5. Tapioca flour: Tapioca flour is made by crushing and grinding finely whole cooked or raw potatoes. It can be used to make (bake) bread, cake and other meals food you can come up with.
6. Tapioca starch: Another product that comes from grinding Tapiocas is starch. Tapioca is the 2nd most common source of plant starch, after maize. We saw that starch is a raw material for many different industries. Further, starch can also be used as a biodegradable alternative in the making of disposable utensils.
7. Animal feed: Beside tapioca itself, the waste products from processing of the crop like peels can be used to feed livestock. Tapioca animal feed is a supplement to what farmers feed their animals.
8. Alcohol: You probably already know that vodka is made by fermenting and distilling tapioca starch. Entrepreneurship along the lines of alcoholic beverages is not just about opening another pub.

1.3 SCOPE OF TAPIOCA PROCESSING INDUSTRY

Tapioca/Cassava in India is used mainly in the human consumption, industrial and animal feed sectors. In India nearly 60% of cassava is used industrially in the production of sago, starch and dry chips. The presented study has clearly indicated that the future of cassava in India lies in its diversified uses in the industrial sector. The projected demand is predominantly in the adhesive sector, especially in the corrugation gums and paper conversion industry, and in the paper industry.

The projected demand-supply gap in the industrial sector is expected to be 1.5×10^6 t of cassava tubers requiring another 750 000 ha to be brought under cassava cultivation. New and potential areas in the non-traditional cassava-growing states are to be considered for area expansion.

There are two types of cassava. The first is sweet cassava, which is used for human consumption. This type has tough or tender flesh and is not bitter. It also has low hydrocyanic acid content. This type is planted all over the world at large scale. The second type is bitter cassava with high hydrocyanic acid content. This is not suitable for human or animal consumption. It is suitable for processing into products such as tapioca pellets, tapioca starch and alcohol.

The processing industry for Tapioca is very well developed in India. A new demand has emerged for tapioca-based raw materials as various industries affected due to rising costs of maize have started using tapioca starch as an alternative to maize starch. The starch produced from maize has been used as a major raw material in industries like textiles, pharmaceuticals, hygienic food products, ice creams and adhesive industries including gum manufacturing units.

Cassava is an important tuber crop in India which is grown in 2.7 lakh hectares' area and the production is 71 lakh tonnes. The average yield of cassava is 22 tonnes per hectare. It is a richest source of starch (25 to 35%) and mainly processed for starch and sago. In India, Tamil Nadu state stands first in area, production and processing of cassava. Even though the area is more in Tamil Nadu the production is not sufficient to meet the growing demand of the food and textile industries. The farmers are cultivating cassava in larger area but the scientific method of cultivation is poor. Scientists are developing lot of varieties, new improved technologies etc., while seeing the knowledge and adoption of recommended practices were found to be least.

Salem district of Tamil Nadu plays a major role in serving the domestic tapioca starch market. Tamil Nadu accounts for more than 30 per cent of the cassava area in India. The remarkable increase in production in Tamil Nadu has been due to very high productivity of cassava in the state. Globalization has impacted the production and use of tapioca.

CHAPTER 2

PREPARATION OF TAPIOCA CHIPS

2.1 TAPIOCA PROCESSING

2.1.1 Processing

Vegetable processing is any deliberate change in a vegetable that occurs before it's available for us to eat. Processing methods extend the shelf life of vegetables.

The increasing young population, globally, disposable incomes and changing lifestyles are promoting higher consumption of tapioca chips. These chips are served as appetizers, side dish, or as snacks. Innovation or new product offering is considered as an opportunity for this market. The introduction of healthier alternatives, like the low-fat and low-sodium chips, in the emerging markets also supports the growth of this industry. There are many tapioca chips substitutes available in the market, and this could be a major threat and also hamper the consumer loyalty, which can further inhibit the tapioca chips market growth.

Processing has three major aims:

1. To make food safe (microbiologically & chemically).
2. To provide good quality products with good flavor, color, texture and taste with less nutrient loss.
3. To make convenient products

To meet consumers' demand for fresh and convenient products, a new category called minimally processed (MP) products, has been created.

The minimal processing involves washing, abrasion, peeling, slicing, chopping, and shredding, with the aim to present convenient, fresh-like, and ready to-eat products to consumers. However, these handlings result in physiological stresses or mechanical damages that deteriorate the products far more quickly than the whole roots. Susceptible to high respiration rate and microbial spoilage, MP carrots become slimy, lose firmness, discolor, and develop off-odors during storage.

Washing the roots before peeling or cutting can help reduce cross-contamination between the cortex and inner parts of the product. The combination of warm water and chlorine washing was found to be most effective in reducing aerobic mesophilic bacteria during storage.

To extend the shelf life of MP products, many studies have focused on physiological, quality, and nutritional implications or packaging conditions

Cleaning and washing: First, the carrots should be cleaned thoroughly to remove any adhering dirt or pesticide residues. This cleaning process usually involves washing the product with running water.

Sorting & Peeling: To achieve a uniformly sized product, vegetables are sorted immediately after cleaning according to their size, shape, weight or color. Sorting by size is especially important if the products are to be dried or heated, because their size will determine how much time will be needed for these processes. Sorted Tapioca are peeled to remove the outer skins.

Cutting: Cutting is important in order to get uniform pieces for heating, drying and packing. Vegetables are usually cut into cubes, thin slices, rings or shreds. The cutting utensils have to be sharp and clean to prevent micro-organisms from entering the food.

Blanching: Blanching is a slight heat treatment, using hot water or steam that is applied mostly to fruits and vegetables before canning or freezing. It is done by immersing products in water at a temperature of 50-55°C. The result is that fruits become soft and the enzymes are inactivated. Blanching is done before a product is dried in order to prevent unwanted color and odour changes and an excessive loss of vitamins.

Drying: After blanching, drying of Tapioca Chips is done. Tapioca chips are then subjected to tray drying by proper arrangement in trays. They are dried till desired finished product quality is obtained.

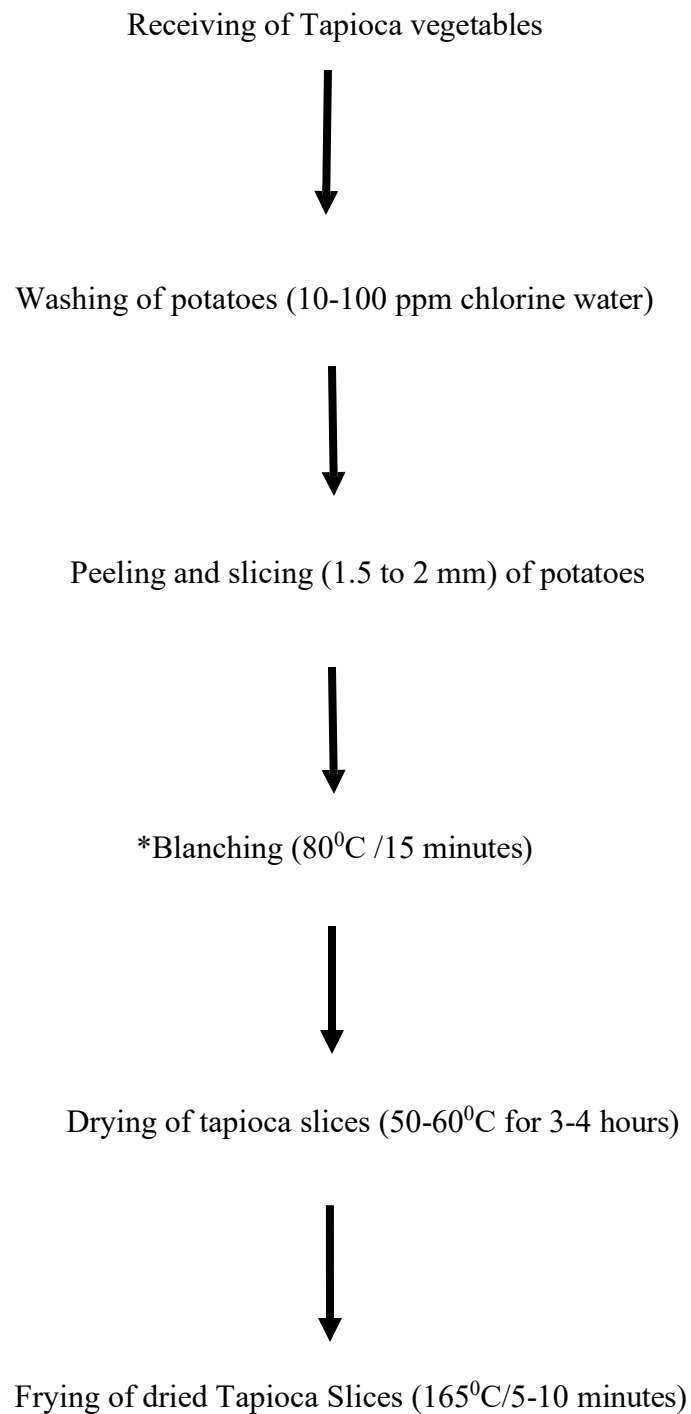
Frying: After drying, frying slices in deep fat frying kettle into desired product quality.

Packaging, Sealing and Storage: The cooled Tapioca Chips are then packed into paper bags, poly pouches or jars as per required pack sizes. Packaging material selection is also of a great

importance to preserve the product quality by avoiding the moisture ingress. Packed Products are stored hygienically till dispatch.

2.2 TAPIOCA CHIPS

Flow chart for Tapioca chips





Cooling at ambient temperature



Packaging

2.2.3 Equipment's involved



Washer: Tapiocas are first washed with warm water to remove adhered particles, dirt and debris



Sorter: Tapioca are then sorted according to their sizes and shapes. They are also graded for their quality with visual inspection.



Washed and sorted Tapioca are peeled.



Peeled Tapioca are diced as per sizes required.



Sliced Tapioca are blanched into blanching machine.



Sliced blanched Tapioca are then dried into cabinet drier as per final product quality requirements.



Dried Tapioca are fried as per finished product quality desired.



Continuous Sealer: Tapioca Chips are cooled and packed into required pack sizes and sealed.



Tray Sealer: Used to seal pack the Tapioca Chips into trays

CHAPTER 3

PACKAGING OF TAPIOCA CHIPS

3.1 THE FACTORS THAT LEAD TO SPOILAGE OF PRODUCT:

The following are the factors which are affecting the quality of the finished product.

- Unhygienic condition of the processing area, Utensils and Staff
- Raw product Quality
- Post processing handling of the products.
- Packaging material quality & Storage condition

3.2 PACKAGING MATERIAL USED FOR TAPIOCA CHIPS

Factors to consider include product damage, fines, stickiness, bag opening size, re-closure among other things.

Packaging: - The Enclosure of products, items or packages in a wrapped pouch, bag, box, cup, tray, bottle or other container to perform the following function: Containment; Protection; and/or preservation; communication and Utility of performance.

The packaging requirements....

- Absolutely leak-proof and prevent contamination
- Protects the contents against chemical deterioration
- No pick up of external flavors
- Be hygienic and safe
- Economical, easy to use and dispose
- Process
- Maintain product composition & quality at full shelf-life.
- Pack size, printing options, display etc.
- Satisfy legislation requirement
- Free from pin holes from supplier side.

- **Grease-proof nature**

The presence of fat indicates that the main requirement of snack food packaging is that it should be grease-proof. This requirement is of significance not only in reducing the rancidity but also to prevent unsightly staining of the package, smudging of the printing and to avoid the actual seepage of the oil and the greasy package feel.

- **Rancidity**

Another requirement due to the high fat content is the prevention of the product coming in contact with the oxygen in the air. A packaging material with low oxygen permeability is desirable to be used, to prevent oxidation and rancidity of fat.

- **Loss of crispness**

One of the major properties of snacks is the crispness, which is achieved during the manufacture of the product by one of the drying methods such as roasting, baking or frying to reduce the level of moisture content. Retention of desirable texture (crispness) is directly related to the moisture level in the product. The moisture content of snack is very low, and any increase due to the hygroscopic nature of the product may lead to loss of crispness of the product. Moreover, added moisture also accelerates other biochemical changes such as oxidative rancidity. Low water vapour permeability of the package is, therefore, another very critical requirement.

- **Machinability**

Some of the snacks have recently moved away from manual filling into preformed bags and are packed on automatic form-fill-seal machines which may run on fairly high speeds. Packaging materials must, therefore, be capable of running continuously and efficiently on these machines.

- **Physical strength**

Due to the high fat content of the snack food products and the associated problem of rancidity, in some of the packages, where longer shelf-life is the requirement, oxygen inside the package may be replaced by an inert gas like nitrogen. The packaging material must be physically strong to withstand the processes of vacuumizing/ gas flushing. The question of stiffness of the material is also debatable. It is desirable that the package should be able to stand up on the shelf, however, high stiffness leads to problems of machinability.

- **Printability**

The packaging material should provide a good printing surface. Attractive printing is the order of the day as a number of brands of similar snack food have to compete in the market.

- **Seal integrity**

To ensure protection against environmental conditions and to provide a long shelf life, the seal integrity of the pack must be good enough to prevent leakage and/or prevent entry of the air or moisture through the seal areas.

Packaging materials Tapioca Chips

Glass: Chemically inert & Will not affect the quality, odor or taste of the product. It is strong, rigid & 100 % recyclable.

PE Pouches (Polyethylene): lightweight, flexible & recyclable, it can be used based on requirements.

Standy pouches: Carrot dehydrated pieces can be packed into standy pouches. They are more convenient to use and with more appeal with respect to handling.

A variety of others packaging materials are available, the ultimate choice of the packing depends upon the required shelf-life, performance on the filling machine and the cost which is purely based on the segment of the market targeted by the manufacturer. The most common choice of packaging medium is Poly pouches as it provides the required protection and preservation, grease resistance, physical strength, machinability and printability. Plastics being lighter in weight are, therefore, the most preferred material for packaging of Tapioca Chips.

To control the growth of spoilage and pathogenic microorganisms during the storage of Tapioca Chips, antimicrobial packaging is considered as one of the most promising methods.

The shelf life of packaged Tapioca products is influenced by the storage conditions, moisture content and the water activity (aw) of the product. Water activity influences the microbial load and facilitates physicochemical deterioration; this is because high water activity level suggests an increase in moisture content and high relative humidity (Ikhu-Omoregbe 2006). Optimum packaging keeps the product readily available for the consumers in a wholesome quality and prevents deterioration caused by microorganisms

The different packaging materials used for storage of Tapioca Chips are mainly paper, plastic and sack bags or a combination of one or two of the materials (Table 8). Paper materials can be coated or laminated with aluminium, and it is superior over other materials because it can be recycled at low cost (Opara and Mditshwa 2013). Plastic films which include low-density polyethylene (LDPE), high density polyethylene (HDPE), laminated aluminium foil (LAF), polyethylene (PE), polypropylene (PP) and plastics containers are widely used for packaging. However, some of these materials are faced with a major setback of the inability to resist light and moisture which can further contribute to degrading the physicochemical and quality of products such as the colour and carotenoids which are heat and light sensitive.

Packaging are also used based on their types:

- Primary Packaging
 - a. Envelops and holds the product.
 - b. Direct contact with the product
- Secondary Packaging
 - a. Used to group the primary packages.
 - b. Present outside the primary unit.
- Tertiary Packaging
 - a. Used for handling of bulk during storage and transport.
 - b. Carton palletized unit of secondary package.

3.3 FUTURE TRENDS: The Minimally Processed food market is one of the most competitive in the FMCG area. Major companies continuously battle to entice consumers from competing brands a strong brand. The developing trends in packaging are:

- Widespread and increasing use of cold seal
- Use of laminated structures and cold seals for premium products
- Increasing use of opaque multi-packs for grocery outlets
- Switch over to higher yield opaque films for cost reduction
- Replacement of Al foil / paper wraps by OPP laminates
- Developments in low temperature heat seal packs

CHAPTER 4

FOOD SAFETY REGULATIONS AND STANDARDS OF TAPIOCA CHIPS

4.1 FOOD STANDARDS

FSSAI category: - it has been covered in category 15.1

Snacks - potato, cereal, flour or starch based (from roots and tubers, pulses and legumes)

Includes all savoury snacks, with or without added flavourings but excludes unsweetened crackers (category 7.1.2). Example includes potato chips], popcorn, pretzels, rice crackers, flavoured crackers (e.g. cheese-flavoured crackers), bhujia (namkeen; snack made of a mixture of flours, maize, potatoes, salt, dried fruit, peanuts, spices, colours, flavours, and antioxidants), and papads(prepared from soaked rice flour or from black gram or cow pea flour, mixed with salt and spices, and formed into balls or flat cakes), khari, kara, murukku, namakpara, chiwda, palakayalu, ribbon or thattupakoda, dalmoth or mixtures, soya nuts, nimki, fali (e.g. cholafali), other fried or baked snacks or savouries, uppuseedai, appam, bhel-mix, sev, gathiya, shankarpali, farsan, kurmura, murrunda, papadi, crisps, chakli, etc. Also includes sweet snacks e.g. chikki, gajak, murrunda, gudchana, sugar coated dals and other sweet dal snacks (dals coated with jaggery, sugar, honey and other ingredients).

Additives allowed as per FSSAI

Code	Food Category	Additive	Additive Number	Permittable Limits
4.2.1.3	Snacks and savouries – potato, cereal, flour or starch based (from roots and tubers, pulses	ASCORBYL ESTERS		200 mg/Kg
		Allura red AC	129	100 mg/Kg
		Brilliant blue FCF	133	100 mg/kg

	and legumes)	Butylated hydroxyanisole (BHA)	320	200 mg/Kg
		CAROTENOIDS	320	100 mg/Kg
		CHLOROPHYLLS AND CHLOROPHYLLINS, COPPER COMPLEXES		350 mg/Kg
		Canthaxanthin	161g	45 mg/Kg
		beta-Carotenes, vegetable	160a(ii)	100 mg/Kg
		Cyclodextrin, beta-	459	500 mg/Kg
		Diacetyltartaric and fatty acid esters of glycerol	472e	20000 mg/Kg
		Grape skin extract	163(ii)	500 mg/Kg
		HYDROXYBENZOATES, PARA-		300 mg/Kg
		IRON OXIDES		500 mg/Kg
		Indigotine (Indigo carmine)	132	100 mg/Kg
		Ponceau 4R	124	100 mg/Kg
		Propyl gallate	310	200 mg/Kg
		RIBOFLAVINS		300 mg/Kg
		BENZOATES		1000 mg/Kg
		SORBATES		1000 mg/Kg
		SULFITES		50 mg/Kg
		TOCOPHEROLS		GMP
		Sunset yellow FCF	110	100 mg/Kg

4.2 FOOD SAFETY

Part I - General Hygienic and Sanitary practices to be followed by Petty Food Business Operators applying for Registration

SANITARY AND HYGIENIC REQUIREMENTS FOR FOOD MANUFACTURER/PROCESSOR/HANDLER

The place where food is manufactured, processed or handled shall comply with the following requirements:

1. The premises shall be located in a sanitary place and free from filthy surroundings and shall maintain overall hygienic environment. All new units shall set up away from environmentally polluted areas.
2. The premises to conduct food business for manufacturing should have adequate space for manufacturing and storage to maintain overall hygienic environment.
3. The premises shall be clean, adequately lighted and ventilated and sufficient free space for movement.
4. Floors, Ceilings and walls must be maintained in a sound condition. They should be smooth and easy to clean with no flaking paint or plaster.
5. The floor and skirted walls shall be washed as per requirement with an effective disinfectant the premises shall be kept free from all insects. No spraying shall be done during the conduct of business, but instead fly swats/ flaps should be used to kill spray flies getting into the premises. Windows, doors and other openings shall be fitted with net or screen, as appropriate to make the premise insect free The water used in the manufacturing shall be potable and if required chemical and bacteriological examination of the water shall be done at regular intervals at any recognized laboratory.
6. Continuous supply of potable water shall be ensured in the premises. In case of intermittent water supply, adequate storage arrangement for water used in food or washing shall be made.

7. Equipment and machinery when employed shall be of such design which will permit easy cleaning. Arrangements for cleaning of containers, tables, working parts of machinery, etc. shall be provided.
8. No vessel, container or other equipment, the use of which is likely to cause metallic contamination injurious to health shall be employed in the preparation, packing or storage of food. (Copper or brass vessels shall have proper lining).
9. All equipments shall be kept clean, washed, dried and stacked at the close of business to ensure freedom from growth of mould/ fungi and infestation.
10. All equipments shall be placed well away from the walls to allow proper inspection.
11. There should be efficient drainage system and there shall be adequate provisions for disposal of refuse.
12. The workers working in processing and preparation shall use clean aprons, hand gloves, and head wears.
13. Persons suffering from infectious diseases shall not be permitted to work. Any cuts or wounds shall remain covered at all time and the person should not be allowed to come in direct contact with food.
14. All food handlers shall keep their finger nails trimmed, clean and wash their hands with soap, or detergent and water before commencing work and every time after using toilet. Scratching of body parts, hair shall be avoided during food handling processes.
15. All food handlers should avoid wearing, false nails or other items or loose jewellery that might fall into food and also avoid touching their face or hair.
16. Eating, chewing, smoking, spitting and nose blowing shall be prohibited within the premises especially while handling food.
17. All articles that are stored or are intended for sale shall be fit for consumption and have proper cover to avoid contamination.
18. The vehicles used to transport foods must be maintained in good repair and kept clean.

19. Foods while in transport in packaged form or in containers shall maintain the required temperature.
20. Insecticides / disinfectants shall be kept and stored separately and away from food manufacturing / storing/ handling areas.

4.3 LABELLING STANDARDS

Labeling requirements for packaged food products as laid down in the Part VII of the Prevention of Food Adulteration (PFA) Rules, 1955, and the Standards of Weights and Measures (Packaged Commodities) Rules of 1977, require that the labels contain the following information:

1. Name, trade name or description
2. Name of ingredients used in the product in descending order of their composition by weight or volume
3. Name and complete address of manufacturer/packer, importer, country of origin of the imported food (if the food article is manufactured outside India, but packed in India)
4. Nutritional Information
5. Information Relating to Food Additives, Colors and Flavors
6. Instructions for Use
7. Veg or Non-Veg Symbol
8. Net weight, number or volume of contents
9. Distinctive batch, lot or code number
10. Month and year of manufacture and packaging
11. Month and year by which the product is best consumed
12. Maximum retail price

4.3.1 Wherever applicable, the product label also must contain the following

The purpose of irradiation and license number in case of irradiated food. Extraneous addition of coloring material. Non-vegetarian food – any food which contains whole or part of any animal including birds, fresh water or marine animals, eggs or product of any animal origin as an

ingredient, not including milk or milk products – must have a symbol of a brown color-filled circle inside a brown square outline prominently displayed on the package, contrasting against the background on the display label in close proximity to the name or brand name of the food. Vegetarian food must have a similar symbol of green color-filled circle inside a square with a green outline prominently displayed. All declarations may be: Printed in English or Hindi on a label securely affixed to the package, or Made on an additional wrapper containing the imported package, or Printed on the package itself, or May be made on a card or tape affixed firmly to the package and bearing the required information prior to customs clearance. Exporters should review the Chapter 2 of the “FSS (Packaging and Labeling) Regulation 2011” and the Compendium of Food Safety and Standards (Packaging and Labeling) Regulation before designing labels for products to be exported to India. FSSAI revised the labeling Regulation and a draft notification to that effect was published on April 11, 2018, inviting comments from WTO member countries and the comments received are under review and the publication date remains unknown. According to the FSS Packaging and Labeling Regulation 2011, “prepackaged” or “pre packed food” including multi-piece packages, should carry mandatory information on the label.



Contact Us

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