



PM Formalisation of Micro Food Processing Enterprises Scheme

Processing of Arecanut



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CHAPTER 1

INTRODUCTION

1.1. Status and Market Size

'Arecanut', botanically known as *Areca catechu*, is a tropical plant found all over South East Asia. This tree belongs to the palm tree species and is from the Arecaceae family. The fruit (nut) of this tree is popularly known as the betel nut or supari in India. The arecanut is an important commercial plantation crop. The fruit has a fibrous mesocarp, and seeds are with a truncate base, endosperm deeply ruminates with a basalar embryo. It is also known as "betel nut" which is the kernel obtained from the fruit of arecanut palm. It is mostly used by the people as masticatory and is an essential requisite during several religious, social and cultural functions of India. The presence of the betel nut is a must in the ceremonial plate, as betel nuts are believed to increase prosperity. The nut is offered to guests, along with a betel leaf, as a mark of respect. It is also used by the local population in native systems as human and veterinary medicine.

India is the major producer and consumer of arecanut in the world and ranks first in terms of both area (58%) and production (53%) of arecanut. Arecanut production in the country crossed 7 lakh tonnes during 2013-14. As per the revised estimates area under arecanut during 2013-14 was 445,000 ha and production was 729,810 tonnes. Total consumption in India is estimated to be 330,000 tonnes per year. It is estimated that more than 10 million people depending on this crop for their livelihood.

Arecanut is the major plantation crop of coastal and southern districts of the country under assured irrigation facility. Karnataka is the largest arecanut producing state in the country with a production of 457,560 tonnes from an area of 218,010 ha. Kerala, Assam, Meghalaya, Tamil Nadu, West Bengal etc., are the other major arecanut growing states in the country. Mumbai, Ahmedabad, Indore, Jaipur, Delhi, Nagpur, Patna, Calcutta, Cuttack, Mangalore, Bangalore, Rajkot, and Chennai are the important marketing centers of arecanut in India. India also exports limited quantity mainly in the form of 'Pan Masala' and 'Gutka'.

1.1.1. Socioeconomic importance

Arecanut is an important commercial crop of India and also forms part of ritual offerings in Hindu religion. The word 'Areca' is taken up from the Malayan language which means 'cluster of nuts'. In India areca nut is mentioned in Ayurveda, and also finds mention as far back as 2,000 years. Marco Polo also mentioned about areca nut in the 13th century. Chewing arecanut with betel leaf (or paan) with some other ingredients is an old habit in the daily life of the Indians. It is an essential requisite during several religious, social and cultural functions of India. The presence of the betel nut is a must in the ceremonial plate, as betel nuts are believed to increase prosperity. The nut is offered to guests, along with a betel leaf, as a mark of respect. It is also used by the local population in native systems of human and veterinary medicine.

Over six million people are engaged in arecanut cultivation, processing and trade. More than 85 per cent of the area under cultivation is made up of small and marginal holdings.

1.1.2. Commercially grown varieties

Table 1: Popular Arecanut varieties

Variety	Growth Habit	Shape and Size of nut	Chali yield (Kg/palm)	Recommended for
South local	Tall	Round, Bold	2.00	Coastal Karnataka
MangalaSaemi	Tall	Round, Small	3.00	Coastal Karnataka
Sumangala	Tall	Oval, Medium	3.20	Karnataka, Kerala
Sreemangala	Tall	Round, Small	3.18	Karnataka, Kerala
Mohitnagar	Tall	Oval to round Medium	3.67	West Bengal, Karnataka and Kerala
SAS-I	Tall	Round, Medium	4.60	Uttara Kannada
Thirthahalli	Tall	Oblong, Small	3.62	Malnad areas of Karnataka
Sreevardhana	Tall	Round, Medium	2.00	Coastal areas

1.1.3. Cultivation Scenario

Areca nut is a crop in areas where abundant rainfall is present as it cannot tolerate drought or low rainfall. It grows well in temperature climates within the range of 14 - 36°C. The tree grows approximately 30 m in height and starts giving fruit from the 5th to 7th year till up to an average lifespan of 60 years. The economic life is on an average of about 40 years.

Areca nut is the major plantation crop of coastal and southern districts of the country under assured irrigation facility.

1.1.4. Production status of Areca nut

Karnataka is the largest areca nut producing state in the country with a production of 457,560 tonnes from an area of 218,010 ha. Kerala, Assam, Meghalaya, Tamil Nadu, West Bengal etc., are the other major areca nut growing states in the country

Table 1: All-India area, production and productivity of Areca nut

Year	Areca nut		
	Area ('000 Ha)	Production ('000 MT)	Productivity (MT/ ha)
1991-92	221.8	251	1.1
2001-02	334.8	409.3	1.2
2002-03	334.8	409.3	1.2
2003-04	365.0	439.2	1.2
2004-05	364.3	452.7	1.2
2005-06	381.1	483.1	1.3
2006-07	382.7	483.3	1.3
2007-08	386.6	476.0	1.2
2008-09	387.1	481.3	1.2
2009-10	400.1	478.0	1.2
2010-11	400.1	478.1	1.2

2011-12	463.9	680.7	1.5
2012-13	446.4	608.7	1.4
2013-14	452.0	622.0	1.4
2014-15	450.2	746.7	1.6
2015-16	474.4	713.8	1.5
2016-17	454.7	722.9	1.6
2017-18	496.7	833.0	1.7

Source: Horticulture Statistics Division, Department of Agriculture, Cooperation & Farmers Welfare.

Table 2: State-wise area and production of Arecanut

S. No	States/UTs	2016-17		2017-18	
		Area (‘000 Ha)	Production (‘000 MT)	Area (‘000 Ha)	Production (‘000 MT)
1.	Andhra Pradesh	0.56	2.37	0.56	2.37
2.	Assam	69.68	70.94	80.81	77.9
3.	Karnataka	227.84	435.75	254.64	517.35
4.	Kerala	95.96	122.16	98.52	130.1
5.	Madhya Pradesh	2.29	3.52	NA	NA
6.	Maharashtra	NA	NA	2.31	3.41
7.	Meghalaya	17.02	27.13	16.93	24.99
8.	Mizoram	11.86	7.27	11.86	7.27
9.	Nagaland	0.39	2.30	0.39	2.3
10.	Tamil Nadu	6.77	9.76	6.50	10.14
11.	Tripura	4.70	9.92	5.99	20.41
12.	West Bengal	11.55	22.85	11.55	22.85
13.	Others	6.03	8.88	6.59	13.89
14.	Total	454.65	722.85	496.65	832.98

Source: Horticulture Statistics Division, Department of Agriculture, Cooperation & Farmers Welfare.

1.1.5. Composition & Nutritive Value of Arecanut

Table 4: Nutritive value of Arecanut

Nutrients	Quantity per 100g
Energy	249(Kcal)
Moisture	31.3(g)
Protein	4.9 (g)
Fat	4.4 (g)
Ash	1.0(g)
Crude fibre	11.2(g)
Carbohydrate	47.2 (g)
Calcium	50 (mg)
Phosphorous	130 (mg)
Iron	1.5(mg)

Source: Nutritive value of Indian foods, NIN, 2019

The main constituents of arecanut are polyphenols, fat, polysaccharides, fiber and protein. It also contains minerals like calcium (0.05%), phosphorus (0.13%), and iron (1.5 mg/100 g) and vitamins (vitamin B6 and vitamin C). Tannins are the main polyphenols present in the arecanut. The other polyphenols mostly of flavonols include about 10% of catechin, 2.5% epicatechin, 12% of leucocyanidin, and 1.3% of another isomer of leucocyanidin, out of the total polyphenols. Among the alkaloids present in arecanut, arecoline is the main and physiologically most active one, varying from 0.1 to 0.67%. Other alkaloids present in trace amounts are arecaidine, guvacoline and guvacine.

Chemical characteristics of the nuts changes with maturity of different varieties and it is observed that two months old tender arecanut offers no resistance while cutting. About four to five months, the outer skin is dark green and inside it is translucent and jelly-like, with the pale coloured streaks making their appearance. Six to seven months old green nut is comparatively hard, but can be cut easily. It has more or less a white core and light brown veins from periphery to core. This stage is ideal for making the

processed kalipak or kaliadeke of South India. At about nine months maturity, the ripe fruit has a yellow to orange red colour; the enclosed hard nut has distinct brown polyphenol veins enmeshing white fat, polysaccharides and the white core. Such nuts are used in raw form or after drying as chalisupari.

1.1.6. Health benefits of Arecanut

Arecanut has been found to possess the following properties.

- Prevents oral cavities, dry mouth, gum infection
- Reduce swelling in gums
- Improve digestion
- Analgesic
- Anti-inflammatory
- Wound healing property
- In the metabolic system as a digestive and carminative
- Anti-diabetic
- Used against certain skin diseases
- Used as aphrodisiac
- Improves eyesight when used as Thamboolaseva
- Helps in relieving asthma

In Ayurveda, arecanut was long considered as having medicinal properties. Vagbhata's (4th Century AD) reference to arecanut describes its use in the treatment of leucoderma, leprosy, cough, fits, worms, anaemia and obesity.

Arecanut has pharmacological actions such as antioxidant activity, antimicrobial activity, cholinergic activity, anti-ovulatory activity, hepato-protective activity, anti-migraine activity, anti-inflammatory activity, fungicidal activity, etc.

Arecanut is reported to have pharmacological properties which may be attributed to its biochemical components such as polyphenols, alkaloids, polysaccharides, fat and proteins. Arecanut extract possess potential anti-oxidative activity and inhibition of free radicals and reactive oxygen species.

1.1.7 Alternative uses of Arecanut

Other parts of the arecanut palm like sheath, stem, leaf, etc. are used in farms and households for manuring, packaging, construction etc.

The main constituents of arecanut are polyphenols, fat polysaccharides, fibre and protein. Besides these, nuts contain alkaloids viz. arecoline (0.1 - 0.7%) and others in trace amounts such as arecadine, guvacoline and guvacine. It was found that tannins, a by-product from the processing of immature nuts find use in dyeing clothes, tanning leather, as a food colour, as mordant in producing variety of shades with metallic salts etc. The nuts contain 8-12% of fat, which can be extracted and used for confectionery purposes. The refined fat is harder than cocoa butter and can be used for blending.

1.2. Indian Market Outlook

Currently, India is the major producer of Arecanut. Arecanut kernel obtained from the fruit is chewed both as raw nut or processed form. Depending upon the nature of end products, the fruit is harvested at different stages of maturity for processing of arecanut. Fully ripe arecanut is generally used by the consumers of coastal Karnataka, Assam, Kerala and northern parts of West Bengal. The processed green arecanut in different forms is favored in Rajasthan, Karnataka and Tamil Nadu.

The users of raw nut in these regions practice crude methods of preservation. In Assam, fresh fruits, as such are preserved in thick layers of mud to elicit a moist chewing feel in the mouth when consumed and the product is known as buratamul. In Kerala, fresh fruits are generally stored by steeping in water. Discolouration of outer husk and foul smell result in this, due to bacterial attack. The inner core is practically well preserved. Such water preserved nuts, known as neetadakaare are favourite of many chewers who ignore its mild off-flavour.

The following factors influence the areca nut market:

- Weather conditions
- Government policies over the pricing of betel nut

- Carryover stocks
- Growth of the consumer industries
- Government policies over the consumer industries

Multi-State cooperative such as CAMPCO (Central Arecanut and Cocoa Marketing and Processing Co-operative), a joint venture of the States of Karnataka and Kerala, has been established in 1973 for procurement of areca nut.

1.3. Value added products from Arecanut

1.3.1. Betel nut, Supari products

1. Dried ripe nuts/ Chali/ Kottapak

The most popular trade type of arecanut is the dried, whole nut known as chali or kottapak. Fully ripe, nine months old fruits having yellow to orange red colour is the best suited for the above purpose. Ripe fruits are dried in the sun for 35 to 40 days on dry levelled ground. For drying and dehusking, sometimes fruits are cut longitudinally into halves and sun dried for about 10 days, then the kernels is scooped out and given a final drying.

2. Kalipak

Another form of processing is by making kalipak. The nuts of 6 to 7 months maturity with dark green colour are dehusked, cut into pieces and boiled with water of dilute extract from previous boiling; a kalli coating is given and dried finally. Kali is the concentrated extract obtained from boiling 3 to 4 batches of Kalipak.

3. Scented suparis

There are many varieties of scented suparis. Dried arecanuts broken into bits, blended with flavour mixture and packed. Formerly the bits were roasted in ghee or oil, but it is almost fully given up nowadays, owing to development of rancidity. The flavouring of supari varies with region and is a closely guarded secret. In South India scented supari is made from kalipak like batlu, Arecanuts and synthetic flavours are added. Instead of raw arecanuts, nowadays, essential oils are used for easy

blending. Rose essence as well as menthol is very common. Coconut gratings are not added nowadays to check microbial growth. These are usually packed in butter paper. Scented suparis popular in north and central India are of two types; the one made from chali and the other from kalipak. The former is more popular. At times, saccharin is used for sweetening. Additives like colour and flavour are added. Plastic strips are used for convenient packing. Tin and aluminum pouches are used for bulk packing of scented supari.

1.3.2. Arecanut husk

It is the outer cover of areca fruit. It constitutes 60-80 per cent of the total volume and weight of the fruits (fresh weight basis). It is now being largely wasted except for being used as an inferior fuel and mulch. Several processes have been developed for utilization of areca husk for making hard boards, plastic and brown wrapping paper. Areca husk is used as a substrate for mushroom cultivation. Arecanut husk fibre is generally longer than jute fibre, goat hair or coir fibre. About 50 per cent of arecanut husk fibre is finer than other fibres and the remaining 50 per cent of fibre is coarser than other fibres.

1.3.3. Areca leaf sheath

Leaf sheath is yet another raw material obtained from the arecanut palm. In a year palm sheds 5-6 leaves. A process has been developed for making plyboards from areca leaf sheath. These boards can be used for making suitcases, fileboards, and tea chests. Leaf sheath cup making machine is available in the market for making arecanut leaf sheath cups of different sizes and shape. Arecanut leaf sheath was found suitable for making plyboards. Two plies of processed arecanut leaf sheaths in combination with an ordinary wood veneer as core glued with urea formaldehyde resin are used for making the plyboards. Leaf sheaths obtained from the farm are highly heterogenous having variations in structure, shape and thickness. The rear end is thicker and the two edges are thinner.

1.4. Post-harvest Processing of Arecanut

1.4.1. Harvesting

It is crucial to harvest the arecanut at specific stages to obtain the best quality produce. Minimum two people with required skills are necessary to accomplish this. One professional tree climber with experience of plucking the fruits and another person who uses gunny bag to catch it when the fruits are falling down are essential. Before the tree climber decides to pluck all the fruits, first he plucks only one/two fruits and indicates the other person to check it. The catcher tastes the fruit and indicates the climber whether to go ahead or not.

The fruits are harvested annually, dried and dehusked. The harvested nuts have to be sun dried for 45 days. It is essential to spread the nuts uniformly in a single layer and turning should be done once a week. This would prevent fungal infection of the nuts.

The post-harvest operations begin soon after the harvest, preferably simultaneously with the harvest.

1.4.2. Stages of harvest

The stage of harvesting depends on the type of produce to be prepared for the market.

1. Dried ripe nuts/ Chali/ Kottapak: Fully ripe, nine months old fruits having yellow to orange red colour is the best suited for the above purpose.
2. Kalipak: Nuts of 6 to 7 months' maturity with dark green colour are used
3. Scented suparis: Both the above types are used.

1.4.3. Yield

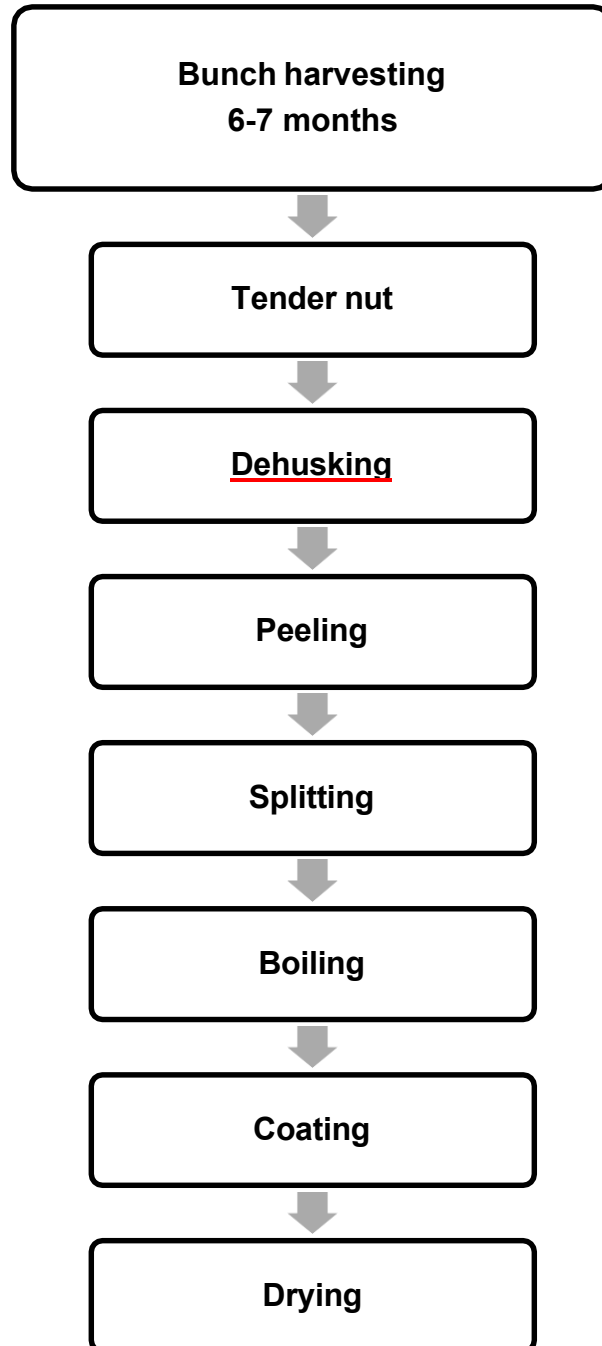
During one full day of harvesting in a typical farm of about 1 acre, an yield of 14-15 gunny bags can be achieved.

1.4.4. Storing and Transporting

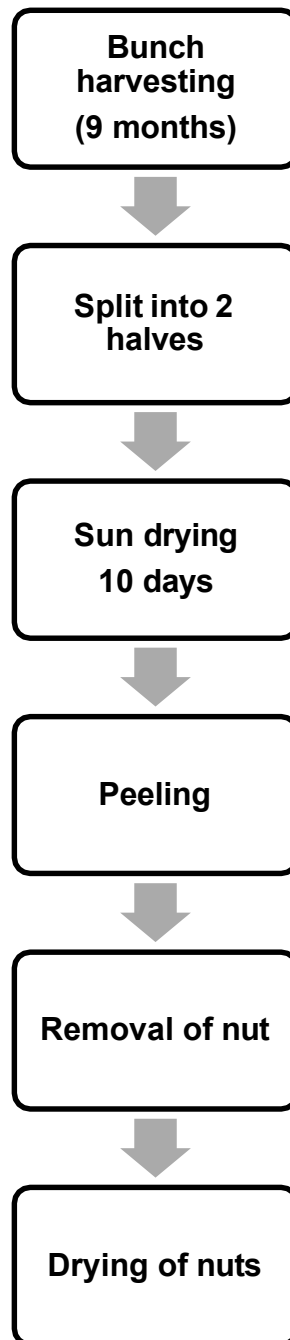
Once the harvesting is completed it has to be transported safely to the processing room, in gunny bags. The capacity of each gunny bag is 60 kgs. So, depending on the quality of the yield, around 800-900 kgs of raw areca nut fruits can be expected per acre. The normal process in these villages is to use the bullock cart to transport. If the quantity is more in the range of 30-40 gunny bags then the truck would be used to transport.

CHAPTER 2
Processing of Arecanut

2.1.a Process Flow chart for Production of Chali/ Kottapak



2.1.b Process Flow chart for Production of kalipak



2.1.1. Separating the fruits from the bunches

Once the fruit bunches are plucked from the tree, it has to be separated to get the individual fruits. This can be done simultaneously when the plucking process is going

on. As the farm will be full of trees, unless there is a big enough space it'll be done on a rather flat place.

2.1.2. Dehusking

a. Manual dehusking

Dehusking and cutting of the nuts are normally done manually by using a curved knife. These knives are made of mild steel with sharp cutting edge and mounted on a wooden base. It has to be done within two days after harvesting. Otherwise, the cutting will not be easy. After dehusking, the nuts are cut into two types based on the maturity of the fruits. Less matured fruits are cut into longitudinal sections called choor and medium matured fruits are cut into transverse sections called nut or kottai. Fully matured fruits are not cut and are processed as round nuts called urundai. Ripened fruits are segregated and processed separately. Normally one labourer can dehusk and cut about 60-75 kg of fruits in eight hours. Since it is a heavy and intensive manual work, there is a need of minimum of 7-8 labourers for 8 h to peel the raw arecanut fruits of 14-15 gunny bags (800 - 900kg).

b. Mechanical dehusking

Arecanut dehusking work can also be carried out using dehusking machines of different capacity in view of scarcity of skilled labourers. Now-a-days, dehusking machines are available in different models starting from dehusking capacity of 30 to 50 kg/h to 225 to 27 kg/ h. Minimum two to three skilled labour are required to operate and work in the dehusking machines.

The mechanical arecanut dehusker consists of a rotary drum having eight numbers of solid rubbers on its periphery. Below this, a concave is placed to aid shelling and to pass the dehusked material down. After dehusking, kernels and husk fall down to the duct and reach the air stream produced by a blower. The husk is thrown out and the kernels/nuts are collected at the outlet. Depending upon the size of the fruits, the spacing between concave and drum has to be changed for minimum breakage and higher efficiency. Grading the dried fruits before dehusking will help to increase the dehusking efficiency and reduce the breakage. One hp electric motor is required to run this machine. Its production capacity is around 30kg/h.

A mechanical dehusker has also been developed by Post Harvest Technology Centre, Gandhi Krishi Vigyan Kendra (GKVK), Bangalore. This machine assembly consists of two sharp edged flaps, one being stationary and the other movable, operated by the pedal through a linkage mechanism. The unit has a hopper to hold about 20 kg of areca nuts. Assembly is made of mild steel, the entire unit is mounted on an angle iron stand and the dehusking mechanism is made of spring steel. This is suitable only for dehusking freshly harvested mature green arecanuts. The dehusking capacity of the unit is 160 kg per day with a running time of eight hours per day. This semi-mechanized dehusker operates at reasonably high output causing less drudgery compared to the traditional method of dehusking which requires a lot of manpower. But it requires skilled labours. Also only half portion of the husk can be removed by using this machine and the rest should be removed by hand.

2.1.3. Peeling

a. Manual arecanut peeling

The raw fruit has to be peeled in order to get nut (kernel). Manual peeling of arecanut is the labour intensive process and not safety to the labor. This task is mainly carried out by ladies in the village. Arecanuts are harvested in different methods as well as different maturity conditions of the nut. Green arecanut is harvested after 80 to 90 days of maturity. In one bunch, there will be several nuts, some are over matured and few are under matured. Usually 10 to 15% of the harvest will be over matured. Peeling of the over matured is very difficult by hand. Instead of peeling, they scrap the outer skin by using sharp knife. This scraped one is usually called as kettagotu. These scrapped ones are boiled and then dried.

After drying, these are once again scrapped by using knife and then sorted according to the quality. Market rate for this variety is always 40 to 30% of the finest variety of the areca nut. Rains during the harvest season will enhance the quantity of the kettagotu as the processing of the arecanut will be stopped and it will be allowed to over mature and then dried. When these nuts are peeled, they will have white coat on the surface and more often outer skin cannot be cleaned completely. They need further processing before sending it to the market.

In addition to peeling of the green arecanut, peeling of red arecanut also carried out. This task of peeling of red arecanut is very tedious one and complete removal of shell is impossible one. This semi peeled one is further processed in traditional manner and dried. This product is generally called as kettagotu/ gorubulu and goes to the market at nearly 1/4 to 1/6th rate of the normal arecanut. This is mainly due to shape and adherence of the parts of outer shell. These kettagotu/ gorubulu are further processed at market by scrapping individual nut by using knife. This is mainly done by women.

b. Mechanized arecanut peeler

Semi mechanized arecanut peeling machines are driven by manually either through hand or pedal. The fully automated arecanut peeling machine is run by electrical motor. The mechanical properties in relation to peeling of the arecanut are found that lateral shear with a rubbing action might be suitable for peeling the fruit. The moisture content of the dry fruit has to be in the range of 5-6% of arecanut weight. These machines are designed to peel areca nut of any size and more efficient.

2.1.4. Splitting of kernel

A hardened steel blade is used to cut the areca nut. When the areca nut moves into the holder, the blade is used to cut the areca nut.

2.1.5. Boiling the kernel

Immediately after the kernel is taken out, it has to be boiled with high temperature for minimum of 12 h. For efficiency purposes, two huge metallic vessels of capacity of 600 litres are being used as seen in the below picture. The arecanut kernel has to be filled in to the vessel mixing with sufficient water. Along with the water, the arecanut precipitate has to be mixed to get good colour.

2.1.6. Coating

During boiling operation, the same water is used for boiling 2-3 batches of arecanut. The extract so obtained is concentrated to get 'Kali'. After boiling the pieces are coated with 'Kali' which imparts a good glossy appearance. Kali coating is repeated to get glossy appearance. Kali contains many polyphenols.

2.1.7. Drying

Currently drying the nuts after boiling by open sun drying for 8 to 10 days is in practice. The moisture content of processed arecanut is reduced from 40 to 11% during drying operation for safe storage and to maintain food quality. This is the last step of arecanut processing. Recently metallic fabricated trays of 6' x 3' size are used for drying purpose. Artificial drying using the fabricated arecanut dryers are also used for drying of arecanut when adequate sun light is not available. While sundrying is in progress, the nuts are heaped every evening and covered with polythene sheets or arecanut dried leaf sheath and the nuts are again uniformly spread on the bamboo mats next day morning. Once the drying process is over, it can be packed in and kept for any number of days before selling it in the retail market. For every 100 kg of raw arecanut fruits, the expected final dried arecanut is in the range of 13-15 kg.

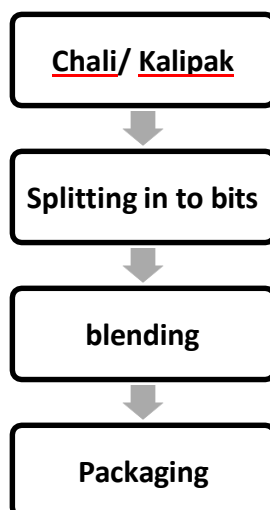
a. Solar cum biomass dryer

For the drying process, a solar cum biomass based dryer with a capacity of one tonne per batch was developed by Tamil Nadu Agricultural University (TNAU), Coimbatore, to meet the thermal energy requirement. The dryer consists of PAU (Punjab Agricultural University) packed bed model solar collector of 20 m² area, biomass burner, heat exchanger, air blower and hot air duct. Solar air heater coupled with biomass gas stove was able to raise the temperature to a maximum of 94.9°C. The savings in fuel wood consumption by the burner is 40%. The system was able to reduce the moisture content of the arecanut from 40% to 11% in 15 hours. Solar cum biomass drier system maintains superior quality of arecanut in terms of flavor and colour compared to open sun dried product, besides saving of time.

2.2. Processing of scented supari

Both Kotapak and Kalipak are used for preparing scented supari. Kotapak and Kalipak are broken into bits using cutting machine. The arecanuts are blended with essential oil, sugar, and flavouring substances.

2.2.1. Processing flow chart for scented supari



CHAPTER 3

Packaging of Arecanut

3.1. Spoilage Factors

In order to select a suitable packaging material/type of package for arecanuts, it is essential to know the factors which affect the quality of arecanuts.

a. Moisture Content

Arecanuts, are hygroscopic in nature and pick-up moisture from the atmosphere. Pick-up of moisture results in loss of quality of the product

b. Insect Infestation

Arecanut are prone to spoilage due to insect infestation, which can be further accelerated due to high humidity, heat and oxygen.

c. Microbial Contamination

In high humidity condition of 65% and above, moisture absorption occurs. Beyond a certain level of moisture content, spoilage due to microbial growth sets in.

3.2. Packaging Requirements

In order to maintain the quality of the arecanuts during handling, transportation, storage and distribution, the packaging material to be used is to be selected with care, keeping in mind the functional as well as the marketing requirements.

The packaging requirements for arecanuts, in general, are listed below:

- To protect the product from spillage and spoilage.
- To provide protection against atmospheric factors such as light, heat, humidity and oxygen. The selected packaging materials should have high water vapour and oxygen barriers.
- Besides the above functional requirements, the packaging material should have good machinability, printability and it should be easily available and disposable.

3.3. Packaging Materials

3.3.1. Bulk Packaging

The traditional method is to use gunny/jute bags for packaging of whole arecanuts. The jute bags may be provided with a loose liner bag of polyethylene or may be without a liner. At times double gunny bags are also used. The double gunny bag is provided with an inner polyethylene liner. The quality of the jute fabric used with respect to the grammage and the weave (ends/picks) varies from one trader to the other. There is no standardisation on the type and quality of the fabric used. A variety of jute fabrics such as hessian, light weight DW, A-twill, heavy CEE etc. are used.

Recently, some of the arecanut traders/packers use alternate bulk packaging media such as woven plastic bags which may be laminated or provided with a loose liner bag and multiwall paper sacks with a plastic liner bag. The plastic based alternate packaging materials are used to overcome the contamination problems associated with jute. Moreover, the plastic bags / liners also help in retaining the quality of the arecanuts packed inside for a longer time.

The latest trend is to use Jumbo bags (Flexible Intermediate Bulk Containers) (FIBCs) for export of arecanuts. These bags have a capacity of up to 1 tonne and offer various advantages such as:

- Bags are flexible, collapsible and durable
- Can be used for packaging of granules, powder, flakes and any free flowing material
- Product wastage / spillage and tampering can be avoided
- Since the handling is mechanised, less labour is required
- Saving in time for loading and unloading
- Bags are light in weight and, therefore, freight costs are reduced
- Creates eco-friendly, pollution free working atmosphere.

The jumbo bags are sometimes made from cloth but mainly from plastic fabric, which can be laminated or provided with an inner plastic liner bag. The bags are provided with filling and discharge spouts and slings for hanging during loading/unloading

operations. For designing a jumbo bag, factors such as capacity, product protection requirement, bulk density of the product, filling and discharge facilities available at the user's end, are to be considered.

3.3.2. Institutional Packages

The arecanut traders also use institutional packs of capacities ranging from 2kg to 10kg. The variety of packages used includes laminated flexible pouches and plastic woven sacks which replace traditional material like tinplate containers and jute bags.

3.3.3. Consumer packaging

The printed flexible pouches have recently become very popular due to their easy availability, excellent printability, light weight, machinability and cost-effectiveness. Also, depending upon the functional and marketing requirements, the laminate/film can be tailor made to serve a specific need. The printed flexible pouches are generally laminates of various compositions. Some of the commonly used laminates are:

- Polyester/metallised polyester/LDPE
- BOPP/LDPE
- BOPP/ metallised polyester/ LDPE
- Polyester/Al foil/LDPE

Polyester and BOPP based laminates are generally more popular for arecanut packaging due to certain advantageous characteristics of each of these two films. Polyester used for lamination is generally 10 or 12 μ thick. The film is highly transparent with excellent clarity, gloss and printability thus enhancing the sales appeal. The film has very low moisture and gas permeability and, therefore, ensures prolonged shelf life of the contents. The very high mechanical strength (tear, puncture, burst and flex) minimises damage to the contents during handling and transportation. The film has good machinability as well as printability. The latest printing technologies help in improving sales promotions. BOPP films may be heat sealable or non heat sealable. The film has high yields, is stable under climatic changes and has excellent moisture barrier. This film is smooth, glossy, crystal clear and has high mechanical strength and non-contamination property for food contact applications.

CHAPTER 4

Food Safety Regulations & Standards

2.3 Fruits and Vegetable Products

Regulation 2.3.55 Arecanuts or Betel nuts or Supari

1. Description:

- (a) "Arecanuts" or "Betel nuts" or "Supari" means nuts obtained from Areca Palm (*Areca catechu L.*)
- (b) The product shall be dry, well matured, sound, clean, whole or cut, fully dehusked, uniform in colour, i.e., bright shining to dull red colour.
- (c) It shall be free from synthetic colouring matter and shall be free from insect infestation, visible moulds, fissures and shrinkage and shall not be hollow.
- (d) The product shall not have any off flavour, odour or other undesirable characteristics and shall also conform to the following standards, namely:

S.No	Characteristics	Requirements
1.	Moisture % (Maximum)	7
2.	Damaged Nuts % (by weight) (Maximum)	12
	a) For whole nuts or supari (Damaged nuts include blemish or cracked nuts, broken nuts, nuts not fully dehusked and those the pith of which is black)	
	b) For cut nuts or supari (Damaged nuts include blemish/cracked nuts, nuts not fully dehusked and those the pith of which is black)	
3.	Damaged by moulds and insects % (by weight) (Maximum)	3

2. Food additives:

The product may contain food additives permitted as follows.

Additive	Recommended level	Additive	Recommended level
Ascorbyl esters	80 mg/kg	Diacetyl tartaric and fatty acid esters of glycerols	10,000 mg/kg
Benzoates	1,000 mg/kg	Ethylene Diamine Tetra Acetates (EDTA)	800 mg/kg
ButylatedHydroxyanisole (BHA)	200 mg/kg	Phosphates	5000 mg/kg
Butylatedhydroxytoluene (BHT)	200 mg/kg	Propyl gallate	50 mg/kg
Canthaxanthin	10 mg/ kg	Sulfites	500 mg/ kg

3. Contaminants, toxins and residues:

The product covered in this standard shall comply with the Food Safety and Standards (Contaminants, toxins and Residues) Regulations, 2011.

Name of the contaminant	Limit µg/ kg
Total Aflatoxins	15
Aflatoxin B1	10
Name of the Insecticide	Maximum Residual Limit (MRL) in mg/kg
Copper Oxychloride(Copper determined as elemental copper)	-
Cuprous Oxide (Copper determined as elemental copper)	-

4. Food hygiene:

(a) The product shall be prepared and handled in accordance with the guidance provided in the Schedule 4 of the Food Safety and Standards (Licensing and Registration of Food Businesses) Regulations, 2011 and any other such guidance provided from time to time under the provisions of the Food Safety and Standards Act, 2006 (34 of 2006).

b) The product shall conform to the microbiological requirements (given in Appendix B) as follows.

Process Criteria		Products-Food Safety Criteria	
Microbe	Limits	Microbe	Limits
Aerobic Plate Count	4x10 ⁴ /g - 1x10 ⁵ /g	Salmonella	Absent / 25 g
Yeast and Mold Count	1x10 ² /g - 1x10 ⁴ /g	Listeria monocytogenes	Absent / 25 g
Enterobacteriaceae	1x10 ² /g - 1x10 ³ /g	Sulphite Reducing Clostridia (SRC)	NA
Staphylococcus aureus	10/g 1x10 ² /g	E. Coli 0157 and Vero or Shiga toxin producing E coli	Absent / 25 g
	-	Vibrio cholera	Absent / 25 g

5. Packaging and labelling:

The product covered by this standard shall be labelled in accordance with the Food Safety and Standards (Packaging and Labelling) Regulations, 2011.

Chapter 1 - General

1.2: Definitions

1.2.1 : In these regulations unless the context otherwise requires:

1. "Best before" means the date which signifies the end of the period under any stated storage conditions during which the food shall remain fully marketable and

shall retain any specific qualities for which tacit or express claims have been made and beyond that date, the food may still be perfectly safe to consume, though its quality may have diminished. However the food shall not be sold if at any stage the product becomes unsafe.

2. "Date of manufacture" means the date on which the food becomes the product as described;

3. "Date of packaging" means the date on which the food is placed in the immediate container in which it will be ultimately sold;

5. "Lot number" or "code number" or "batch number" means the number either in numerical or alphabets or in combination thereof,

- representing the lot number or code number or batch number,
- being preceded by the words "Lot No" or "Lot" or "code number" or "Code" or "Batch No" or "Batch" or any distinguishing prefix
- by which the food can be traced in manufacture and identified in distribution.

10. "Use – by date" or "Recommended last consumption date" or "Expiry date" means the date

- which signifies the end of the estimated period under any stated storage conditions,
- after which the food probably will not have the quality and safety attributes normally expected by the consumers and the food shall not be sold

11. "Vegetarian Food" means any article of Food other than Non- Vegetarian Food as defined in regulation 1.2.1(7).

Regulation 2.1: Packaging

Regulation 2.1.1: General Requirements

2. Containers made of plastic materials should conform to the following Indian Standards Specification, used for packing or storing whether partly or wholly, food articles namely:-

- i. IS : 10146 (Specification for Polyethylene in contact with foodstuffs)
- ii. IS : 10142 (Specification for Styrene Polymers in contact with foodstuffs)
- iii. IS : 10151 (Specification for Polyvinyl Chloride (PVC) in contact with foodstuffs)
- iv. IS : 10910 (Specification for Polypropylene in contact with foodstuffs)
- i. IS: 12252 (Specification for Polyalkylene terephthalates)

Regulation 2.2: Labelling

Regulation 2.2.1: General Requirements

1. Every pre-packaged food shall carry a label containing information as required here under unless otherwise provided, namely -
2. The particulars of declaration to be specified on the label shall be in English or Hindi in Devnagri script: Provided that nothing herein contained shall prevent the use of any other language in addition to the language required under this regulation.
3. Pre-packaged food shall not be described or presented on any label or in any labelling manner that is false, misleading or deceptive or is likely to create an erroneous impression regarding its character in any respect;
4. Label in pre-packaged foods shall be applied in such a manner that they will not become separated from the container;
5. Contents on the label shall be clear, prominent, indelible and readily legible by the consumer under normal conditions of purchase and use;
6. Where the container is covered by a wrapper, the wrapper shall carry the necessary information or the label on the container shall be readily legible through the outer wrapper and not obscured by it;
7. License number shall be displayed on the principal display panel in the following format, namely:-



Provided that the existing products of a unit shall comply with the requirement of this clause on and after the six months of commencement of the Food Safety and Standards (packaging and labelling) Amendment Regulation ,2013.

Regulation 2.2.2 Labelling of Pre-packaged Foods

In addition to the General Labelling requirements every package of food shall carry the following information on the label, namely —

1. The Name of Food: The trade name or description of food contained in the package.
2. Ingredient: *(For a single ingredient product, it can be mentioned as such.)*
3. Nutritional information –
4. Nutritional Information or nutritional facts per 100 gm or 100ml or per serving of the product shall be given on the label containing the following:—
energy value in kcal;
the amounts of protein, carbohydrate (specify quantity of sugar) and fat in gram
5. Declaration regarding Veg or Non veg

Every package of Vegetarian Food shall bear a declaration to this effect by a symbol and colour code as stipulated below for this purpose to indicate that the product is Vegetarian Food. The symbol shall consist of a green colour filled circle, having a diameter not less than the minimum size specified in the Table below, inside the square with green outline having size double the diameter of the circle, as indicated:



iv. Size of the logo (vegetarian)

S No	Area of principal display panel	Minimum diameter mm
1.	Upto 100 cms. Square	3
2.	100-500 cm square	4
3	500-2500 cm square	6
4	>2500 cm square	8

The symbol shall be prominently displayed on the package having contrast background on principal display panel, just close in proximity to the name or brand name of the product and on the labels, containers, pamphlets, leaflets, advertisements in any media.

5. Declaration regarding Food Additives-

(i) For food additives falling in the respective classes and appearing in lists of food additives permitted for use in foods generally, the following class titles shall be used together with the specific names or recognized international numerical identifications:

Acidity Regulator, Acids, Anticaking Agent, Antifoaming Agent, Antioxidant, Bulking Agent, Colour, Colour Retention Agent, Emulsifier, Emulsifying Salt, Firming Agent, Flour Treatment Agent, Flavour Enhancer, Foaming Agent, Gelling Agent, Glazing Agent, Humectant, Preservative, Propellant, Raising Agent, Stabilizer, Sweetener, Thickener

6. Name and complete address of the manufacturer

- i. The name and complete address of the manufacturer and the manufacturing unit if these are located at different places; in case the manufacturer is not the packer, the name and complete address of the packing unit shall be declared on every package of food;
- ii. Where an article of food is manufactured or packed by a person or a company under the written authority of some other manufacturer or company, under its brand name, the label shall carry the name and complete address of the manufacturing or packing, the name and complete address of the manufacturer or the company and on whose behalf it is manufactured or packed or bottled.

7. Net quantity by weight shall be declared on every package of food.

8. Lot/Code/Batch identification shall be given on the label.

9. Date of manufacture or packing.

The date, month and year in which the commodity is manufactured, packed or pre-packed, shall be given on the label.

If the 'Best before Date' of the products is

- More than three months, the month and the year of manufacture, packing or pre-packing shall be given.

- Less than three months, the date, month and year in which the commodity is manufactured or prepared or prepacked shall be mentioned on the label.

10. Best Before and Use By Date : the month and year in capital letters upto which the product is best for consumption, in the following manner, namely:—

“BEST BEFORE MONTHS AND YEAR

OR

“BEST BEFOREMONTHS FROM PACKAGING

OR

“BEST BEFOREMONTHS FROM MANUFACTURE (Note: blank be filled up)

12. Instructions for use:

(i) Instructions for use, including reconstitution, where applicable, shall be included on the label, if necessary, to ensure correct utilization of the food.

Regulation No. 31

Every package of supari and advertisement relating thereto shall carry the following warning in conspicuous and bold print, namely

<p style="text-align: center;">Chewing of Supari is injurious to Health</p>
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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 equipment's shall be kept clean, washed, dried and stacked at the close of business to ensure freedom from growth of mould/ fungi and infestation.
10. 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.

Manufacturers List of Food Processing Machineries

So	Name of the company	Machineries
1.	<p>KCI Arecanut</p> <p>B. Kumar (Proprietor)</p> <p>Kovai Classic Industries</p> <p>No. 1, Iyer Hospital Road,</p> <p>Singanallur Post</p> <p>Sowripalayam, Coimbatore - 641005,</p> <p>Tamil Nadu, India</p>	Dehusking Machine
2.	<p>Smith Industries</p> <p>S. F. No. 233/1A, 1B, Site No. 1,</p> <p>SriMahalakshmpuram</p> <p>Saravana Nagar,</p> <p>Coimbatore - 641022, Tamil Nadu, India</p> <p>Suresh Kumar K. B. (Proprietor)</p> <p>Call 08048600824</p>	Dehusking Machine
3.	<p>Maruthi Engineering Works</p> <p>Old Market Place,</p> <p>Channagiri, Davangere-577213,</p> <p>Karnataka, India</p> <p>Call 08048730949</p>	Dehusking Machine
4.	<p>Star Associated Industries</p> <p>C-44, Rani Channamma Nagar,</p> <p>Angol Industrial Estate,</p> <p>Belgaum-590008, Karnataka, India</p> <p>Call 08045327533</p>	Dehusking Machine

5.	<p>Best Engineering Technologies Plot No -4, survey no.174 & 176, IDA Bollaram village gram panchayat Hyderabad - 502325, Telangana, India</p> <p>Contact Person : M. SessaSai (Partner) Mr.Gowtham 08043046080</p>	Peeling machine
6.	<p>V-Tech Engineers V-Tech Engineers Kuntavalli, Melige Post, Thirthahalli(Tq), Shivamogga– 577415</p> <p>08181 - 272075 08181 - 272175</p>	Dehusker and peeler



Contact Us

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