CHAPTER II

COCONUT AND COCONUT PRODUCTS-
AN OVERVIEW
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2.1 Introduction

Coconut is a remarkable renewable resource that God has provided for the poor people in developing countries, with constituents that have many unique and superior properties. Coconut assumes considerable significance in the national economy in view of rural employment and income generation. It seems to be feasible to take advantage of these unique properties by converting the constituent parts of the coconut melon into a variety of value-added products that can be consumed in the village or sold outside the village, providing food, housing materials, clean water, electric energy, and jobs in the village, all in a sustainable environment. It is our hope and prayer that God will guide us to good solutions as we seek to bring this promise to a usable reality that can be deployed worldwide.

2.2 Historical Origin of Coconut Plantations

The coconut palm is one of the most useful plants in the world. Grown in more than 90 countries of the tropics, the coconut palm has been known to exist in most regions of the tropics from pre-historic times. Besides having a widespread pressure in the tropical low lands vis-a-vis many other useful crops, the coconut palm has a hoary antiquity in some of the countries. But in the absence of clinching evidence it has not been possible to trace its origin to any particular region or country. The long-drawn-out debate on the subject for well over a century has not reached a general agreement on assigning the original habitat of the palm.

There are three theories on the origin and subsequent distribution of the coconut palm. According to the first theory, the palm came from the same stock which gave rise to the American members of the genus cocos and originated in the valleys of the Andes in Colombia from where the dispersal might have been effected
by the prehistoric explorers in the Pacific. The second theory attributes its origin to the coasts of Central America from where the nuts might have been carried over by the equatorial ocean currents to the Pacific Islands. The third theory presumes its place of origin to be somewhere in South Asia or Malaysia or in the Pacific from where coconut might have accidentally reached the coasts of America\(^1\).

Coconut palms have existed in India for 3000 years. Organized efforts to develop the crop began only a century ago. The history of its development and the commercial exploitation of the products have three distinct phases covering the latter half of the last century i.e. the period from 1900 to 1945 and from 1945 to 1976.\(^2\)

### 2.2.1 The First Phase

The first phase of coconut development coincides with the expansion of European soap and edible oil industry which required large quantities of imported copra for feeding the mill sector. The increased demand for coconut products in the European markets gave a fillip to coconut cultivation and copra trade. With the introduction of wheeled traffic and increased shipping facilities, the export trade of coconut products expanded considerably, which resulted in a renewed interest in coconut cultivation.

It was sometime during the period that the coconut growers in the then central Travancore area of Kerala State noticed the incidence of an unknown disease in isolated patches, which is now known as root wilt disease. In 1897, the coconut growers of the area presented a memorandum to the government describing the financial loss suffered by them due to the incidence of this disease. The British Government appointed Dr. E.J. Butler, the Imperial Mycologist to investigate the problem. He could not solve the problem, but helped them to develop a modern line of approach to the problems of coconut cultivation in the country. Towards the end of the last century, agricultural departments were established in various states, thereby making coconut development a recognized work.
2.2.2 The Second Phase

The dawn of the present century found India in a formidable position in the export trade in copra and coconut oil. During the years 1909 to 1914, India exported about 31,000 tonnes of copra and 9,000 tonnes of coconut oil annually. The tempo in the production front did not last long. The prices started crashing during the World War I and the general economic crisis forced the growers to neglect the cultivation. Even after the War, the prices failed to recover and the apathy of the growers still continued. During the post War-period, exports of copra and coconut oil started declining, while imports gained momentum. But by 1924, the exports had come to a standstill.

Though export trade in the coconut products ceased to continue, the domestic demand started to pick up, which in turn necessitated governmental efforts for increasing the production. In 1916, with the establishment of coconut Research Station at Nileshwar and Kasaragod, coconut developmental activities attained a purposeful momentum. At the same time coconut palms were cultivated by departments of agriculture in the then Cochin and Travancore regions of Kerala state also. By the early thirties, the government came to recognize the importance of the genetic improvement of the crop and envisaged schemes for the establishment of coconut nurseries. During the period, the coconut area in the country also recorded a small increase from 0.5 million hectares in 1920-21 to 0.57 million hectares in 1930-31. 3

The world trade in copra, coconut oil and other coconut products was seriously affected by the outbreak of the Second World War. The war situation in general had an adverse effect on the production and marketing of coconuts in the domestic sector. Decline in production coupled with marketing bottlenecks finally forced the Government of India to step in, who in 1943, initiated an enquiry into the production aspects, regulation of imports of copra and coconut oil, improvement of quality of copra and coconut oil and better utilization of shell and fibre. The enquiry commission recommended the setting up of a statutory body for coconut with powers and functions similar to those of the Ceylon
Coconut Board. The Government of India accepted the recommendations to set up a statutory body with fewer functions. Thus the Indian Central Coconut Committee was formed in February 1945 by virtue of the Indian Coconut Committee Act of 1944. The committee continued to function till March 1966 and after that the Directorate of Coconut was established in its place, which took over the development and marketing coconut in the country.

2.2.3 The Third Phase

The third phase which covers the period from 1945 to 1986 has heralded the era of coconut development in the country. It was in this period that integrated efforts for modernizing coconut culture and industry were promoted. Some of the major development programmes implemented during this period were the collection of reliable statistics on area and production, the establishment of central and regional research stations, commercial production of coconut hybrids and the establishment of hybrid seed gardens, the coverage of more than 10 per cent of the total coconut area in the country under the package programme, establishment of nurseries, parasite breeding station, financial assistance given to the growers for expansion of area under coconut and encouragement given to growers’ co-operatives for improved marketing and processing activities. These promotional activities led to an increase in the area and production of coconut in the country.  

In 1945 the Indian Central Coconut Committee was constituted which continued upto 1966 (1945-1966, I st Phase). In 1966, the Coconut Committee was abolished and in its place the Directorate of Coconut Development was established which continued till 1981 (1966-1981, IInd Phase). The Directorate of Coconut Development was subsequently abolished and in its place the Coconut Development Board was established in the year 1981 and the Coconut Development Board is continuing now (1981 and continuing, IIIrd Phase)

2.3 Varieties of Coconut

There are only two distinct varieties of coconut, the tall variety and the dwarf variety. Owing to cross pollination, a wide range of variation occurs within
the same variety. This is more commonly seen among the tall ones. The variations may relate to the height of palm, colour, shape and size of the nut as well as yield and quality of copra. For instance, among the ordinary tall variety, green and brown colour types occur. Similarly in the dwarf, three colour types, i.e. orange, yellow and green are common. More than 12 hybrid varieties have been released.

2.3.1 Tall Variety

The tall variety is extensively cultivated in all the coconut tracts of the world. It has a long and stout trunk with a swollen base called ‘bole’. This variety is characteristically tall, growing to a height of about 15 to 18 meters. The crown will have 25 to 40 fronds and the length of a fully opened frond will be about 6 meters. It is a comparatively hard type, and lives up to a ripe age of 90 to 100 years. It tolerates diverse soil and climatic conditions and bears fruit in seven to ten years if planted under rainfall conditions. The tall variety is largely cross-pollinating. However, slight chance for self-pollination also exists due to overlapping of spadices in the summer season. Its copra, oil and fibre are of good quality. The nuts mature within a period of 12 months after pollination. The following are the common tall varieties cultivated in different countries–West Coast Tall, Lakshadweep Ordinary, Lakshadweep Micro, Andaman Ordinary, Kappadam, Laguna, San Raman, Magapuno, Spicata, Java, New Guinea, Cochin China, Philippines Ordinary and East Coast Tall.

2.3.2 Hybrid Palms

The manifestation of heterosis or hybrid vigour in a perennial crop like the coconut palm was first reported from India in 1932 in intervarietal crosses involving the tall variety as the female and the dwarf variety as the male. The seedlings exhibited hybrid vigour which becomes manifest in the nursery in the vegetative characteristics such as height, girth at the collar and number of leaves. The seedlings on planting had a rapid growth rate with a higher rate of production, shorter pre-bearing period, high bearing capacity and economic nut
characteristics. These findings in India led to the cultivation of hybrid vigour for the genetic improvement of the coconut palm for high yield, which has now been adopted as a wide recognized programme in the major coconut growing countries. The first coconut hybrid in the world was produced in India during 1930s with WCT x CGD. Considerable work on the production, evolution and mass distribution of seedlings is now in progress in most of the major coconut growing countries. The inter-varietal hybrids produced in these countries for commercial plantings are the Tall x Dwarf and the Dwarf x Tall with different parental combination. Besides, intra-varietal hybrids like Tall x Tall are also produced in large numbers in India and Sri Lanka. These released hybrid varieties are given in Table 2.1.

Table 2.1 Released Hybrid Varieties

<table>
<thead>
<tr>
<th>Hybrids</th>
<th>Nuts yield / Palm / Year</th>
<th>Mean / Nut (g)</th>
<th>Mean / Palm (kg)</th>
<th>Copra Yield / Hectare (t)</th>
<th>Oil Content (Present)</th>
<th>State of Which Recommended</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chandra Sankara (COD x WCT)</td>
<td>116</td>
<td>215</td>
<td>25</td>
<td>4.4</td>
<td>68</td>
<td>Kerala, Karnataka, Tamil Nadu</td>
</tr>
<tr>
<td>Kera Sankara (WCT x COD)</td>
<td>108</td>
<td>187</td>
<td>21</td>
<td>3.5</td>
<td>68</td>
<td>Kerala, Tamil Nadu</td>
</tr>
<tr>
<td>Chandra Laksha (LOxCOD)</td>
<td>109</td>
<td>195</td>
<td>21</td>
<td>3.7</td>
<td>69</td>
<td>Kerala, Karnataka</td>
</tr>
<tr>
<td>Laksha Ganga (LO x GB)</td>
<td>108</td>
<td>195</td>
<td>21</td>
<td>3.7</td>
<td>70</td>
<td>Kerala</td>
</tr>
<tr>
<td>Ananda Gangan (AOxGB)</td>
<td>95</td>
<td>216</td>
<td>21</td>
<td>3.6</td>
<td>68</td>
<td>Kerala</td>
</tr>
<tr>
<td>Kera Ganga (WCT x MYD)</td>
<td>100</td>
<td>201</td>
<td>21</td>
<td>3.5</td>
<td>69</td>
<td>Kerala</td>
</tr>
<tr>
<td>Kera Sree (WCT x MYD)</td>
<td>112</td>
<td>216</td>
<td>24</td>
<td>4.2</td>
<td>66</td>
<td>Kerala</td>
</tr>
<tr>
<td>Kera Sowbogya (WCT x SS Apriccot)</td>
<td>130</td>
<td>195</td>
<td>25</td>
<td>4.3</td>
<td>65</td>
<td>Kerala</td>
</tr>
<tr>
<td>VHC-1 (ECT x DG)</td>
<td>98</td>
<td>135</td>
<td>13</td>
<td>2.3</td>
<td>70</td>
<td>Tamil Nadu</td>
</tr>
<tr>
<td>VHC-2 (ECT x MYD)</td>
<td>107</td>
<td>152</td>
<td>16</td>
<td>2.9</td>
<td>69</td>
<td>Tamil Nadu</td>
</tr>
<tr>
<td>Godhavari Ganga (ECT x GB)</td>
<td>140</td>
<td>150</td>
<td>21</td>
<td>3.7</td>
<td>69</td>
<td>Andhra Pradesh</td>
</tr>
<tr>
<td>WCT (Control)</td>
<td>80</td>
<td>176</td>
<td>14</td>
<td>2.5</td>
<td>68</td>
<td></td>
</tr>
</tbody>
</table>

Source: H.P. Singh, Markose V.T., Remany Gopalakrishnan, 30 years of Coconut Industry, 1999, p.16.
2.4 Strengths of Indian Coconut Industry

1. India is one of the leading producers of coconut in the world with production of about 13 billion nuts per annum.

2. Coconut area is distributed in 18 states and three Union Territories under different agro-climatic conditions.

3. 3000 years of tradition in coconut cultivation. Also, India is a premier coir manufacturing country in the world.

4. Hundreds of reputed and established private firms are engaged in manufacturing and marketing of various coconut products (including branded coconut oil) in small packs.

5. Wide range of coconut products, both edible and non-edible, is available for export to different countries.

6. Research support by reputed organisations such as CSIR, ICAR and DRDO.

7. Technical know-how and trained manpower available for manufacturing of various coconut based products. Good number of cultivars/varieties having specific nut characteristics.

2.5 Problems of Indian Coconut Industry

With more than ten million people in India depending on coconut cultivation, processing, marketing and trade related activities for their livelihood, the sustainability of the coconut industry poses a big question. The dominant position held by coconut is falling on account of the following problems:

1. Low farm productivity due to mono-cropping practice, poor genetic makeup and nutrient deficiency of the soil.
2. Post-harvest losses due to quality deterioration of copra in storage and transport, insect infestation, poor copra making practices and lower oil recovery due to harvesting of immature nuts.

3. Price instability due to increasing competition from substitute oils, especially from palm and soybean, both in the domestic and international markets.

4. Relative unremunerativeness of coconut farming as it is predominantly monocropdrance to increased investment in coconut culture.

6. Decline in coconut acreage due to land conversion for commercial and industrial purposes.

2.6 Coconut Products

Major coconut production in the country is primarily on account of the demand from consuming States for traditional products, viz. matured nuts, tender coconut water, coconut oil, desiccated coconut, oil cake and coir products. Nearly 90 per cent coconut production is directed for traditional use in domestic markets. The most important traditional commercial product traded in the country has been the coconut oil. Therefore, the demand and supply of this single coconut product determines the price of raw coconut. Moreover, the market share of coconut oil both in domestic and export market is declining due to tough competition, especially from palm and soyabean oil prices.

In the process of diversification and product development, strategic market research is essential to bring new coconut products in the market. Besides, coconut oil and oil cake, the coconut processing industry traditionally has been confined to copra production, manufacture of desiccated coconut, coir and coir products only. Because the coconut processing sector confined to these traditional products, it has been observed that in spite of commendable achievements made in enhancing the production and productivity of coconut, the processing sector
could not make much progress in the direction of diversification and value addition to coconut products.

The processing determines effective utilization of harvested produce and the quality of the end product, which ultimately affects the consumption and acceptance of the product. Some of these products, viz. coconut milk, coconut cream, spray dried coconut milk powder, vinegar, packed tender coconut water, snowball-tender-coconut and virgin-coconut-oil have been produced on a commercial basis. Besides, coconut biscuits, coconut chips, coconut based-sweets and coconut chutney like traditional convenience products, using indigenous technology were already available in the market.

The Government of India, through the Coconut Development Board, made strategic efforts and motivated entrepreneurs, industrialists and artisans exhibit products in national and international trade fairs and exhibitions, to get better access to up country markets. Coconut shell and wood-based products viz. handicrafts and utensils certainly have aesthetic utility and value. It has been observed that these products have good demand for export too.9

2.7 Marketable Products of Coconut

Coconut is a product giving multifarious utility. It is noticeable that almost all the parts of freshly grown coconut, eatable coconut or dried coconut are used in one or another manner. Coconut provides food, edible oil, industrial oil, and health drink to humanity. It being a versatile crop, many value added products can be made out of it. Each and every part of the coconut palm is useful to man in one way or another and the crop profoundly influences the socio-economic security of millions of farm families.
Figure 2.1 COCONUT PRODUCTS

- Sugar/Jaggery
- Beverage (Boiled Sap)
- Toddy (Fermented Sap) (Coconut Wine)
- Neera (Fresh Sap)
- Vinegar
- Confectionery Jelly

Products from Inflorescence SAP

- Young Coconut in Syrup
  - Coconut Jam
  - Puddings / Ice Cream

Products from Coconut Meat

- Matured Coconut
  - Desiccated Coconut
  - Partially De-fatted Coconut Powder
  - Roasted Coconut Paste
  - Coconut Chips/Sweetened Chips (Sliced Coconut)
  - Ball Copra
  - Cup Copra/Coconut Flour
  - Coconut Yoghurt/Ice Cream
  - Fresh Coconut Gratings
  - Dehydrated Edible Coconut Meat
  - Coconut Oil/ Virgin Coconut Oil

- Milk Powder (Dehydrated Milk)
- Coconut Milk / Syrup
- Coconut Spread / Cheese
- Coconut Honey / Candy
- Coconut Skim Milk Beverage
- Sweetened Coconut Skim Milk Blend
- Coconut Protein
- Low Fat / High Fat Coconut Jam
- Virgin Coconut Oil
- Young Coconut / Tender Nut
  " Tender Nut Water
  " Tender Nut Water & Meat Shake
  " Pouched / Tinned Tender Nut Water

Products from Coconut Milk

- Matured Coconut
  " Coconut Water Concentrate (Syrup) as Beverage on dilution - as coconut lemonade/pineapple/mango
  " Carbonated / non carbonated Coconut Water
  " Nata de Coco
  " Vinegar
  " Toddy

Products from Coconut Water

- Dietary Oil
- Bio Diesel / Bio Fuel
- Industrial Oil
- Cosmetics

Products from Coconut Oil
2.7.1 Products from Infiorescence Sap

2.7.1.1 Coconut Toddy

Coconut toddy is a sugar containing juice obtained by tapping the unopened spadix of the coconut palm. Apart from its traditional use as a drink, the juice obtained from tapping the inflorescence is rich in sugar and is converted into jaggery, sugar, vinegar and fermented toddy.

2.7.1.2 Vinegar

Vinegar produced from matured coconut water is gaining acceptance as a non-artificial health friendly product. It is an acetic product prepared from coconut water and is used in pickle industry and fast food centres.

2.7.2 Products from coconut meat

2.7.2.1 Raw Kernel

Raw kernel is an important article of food. The apple or cotyledon developing during germination and the tender bed are delicacies. The tender husks of some varieties are edible and are sometimes pickled.

2.7.2.2 Coconut Syrup

The processed coconut syrup preserved in lacquered tin cans can find various end uses in the confectionery and bakery industries. It gives a delicious instant drink which is milk white in colour when mixed with water and is also an excellent bread spread.

2.7.2.3 Coconut Cream

Coconut cream is the concentrated milk extracted from fresh coconut kernel. This is a ‘ready to use’ product which can be either used directly or diluted with water for various preparations like curries, sweets, desserts,
puddings, ice-creams, soft drinks, etc. It can also be used in the manufacture of bakery products and for flavouring food stuffs.

**2.7.2.4 Desiccated Coconut**

Desiccated coconut is ground or shredded dried coconut meat with natural flavour and aroma. It is mainly used in biscuits, confectionery, bakery and other food industries.

**2.7.2.5 Skim Milk Powder**

A very promising coconut milk based product is the skim milk powder. It is a white and deliquescent powder possessing a fresh, sweet, coconut flavour. The average composition of the powder is 24 per cent protein, 6 per cent fat and 5 per cent moisture. It is a valuable commodity in the food and beverage industry. It could also be an excellent low-fat coconut flavoured beverage base. The concentrated syrup made out of the skim milk is also a very delicious product and could be used just like jam and also is a base for the preparation of instant coconut soft drinks.

**2.7.2.6 Coconut Chips**

Coconut chip is the thinly sliced crispy coconut meat. Coconut chips, as any other chips, is a ready-to-eat snack food. It is prepared in salted and sweetened forms. The coconut kernel is cut into the form of chips using a chipper. The cut ships are soaked in sugar or salt solution for about 40 minutes. The chips are then baked in a hot air oven till the product attains a golden brown colour.

**2.7.2.7 Copra**

Copra, the dried kernel is the chief commercial product from coconut, which is mainly used for oil extraction. Copra normally has an oil content varying from 65 to 72 per cent. Two types of copra, namely milling copra and
edible copra are made in India. Milling copra is used to extract oil, while edible grade of copra is consumed as a dry fruit and used for religious purposes.

Milling copra is generally manufactured by adopting sun drying and artificial means. Substantial quantity of milling copra is manufactured using modern hot air driers resulting in the availability of superior quality copra which is required for the manufacture of best grade coconut oil. A good number of farmers co-operatives are also involved in the manufacture and marketing of milling copra. Milling copra is available in different grades. Edible copra is made in the form of balls and cups. Different grades of edible copra are available in the market according to the size, colour, etc.

2.7.2.8 Coconut Dietary Fibre (Flour)

Coconut flour obtained as a residue while making virgin coconut oil is being introduced as an excellent source of dietary fibre for health foods. This fibre contains proteins, nutrients and sugar that are present in fresh coconut meat.

2.7.2.9 Coconut oil

Coconut oil and its products with medium chain fatty acids have a greater role to play in the fast developing functional food sector, particularly baby foods, nutriceuticals, pharmaceuticals, etc. “Coconut Oil is the healthiest oil on earth” says Dr. Bruce Fife, a naturopathic doctor and the author of the book,” The Healing Miracles of Coconut Oil”. The oil from the nut is used in cooking and in the manufacture of soaps, cosmetics and toilet requisites, and for making lubricant greases, synthetic detergent, laundring and cleaning preparations as a fatty acid.

Coconut oil is an ideal confectionery fat, wildly used in the manufacture of biscuits, chocolates and confectioneries as it provides a moisture barrier and imparts a high gloss for baked items in spray oil use. Refined bleached deodorized coconut oil is used in the production of ice cream, as it completely replaces milk fat, and also acts as a milk replacement in the production of baby
food and coffee whiteners (creamers). Coconut oil is an excellent cooking oil, especially for deep-frying as it keeps the food very crisp for a longer period.

Coconut oil is also used for application on hair. The research has thrown up some compelling findings which establish the beneficial effect of coconut oil as a hair damage protectant, a conditioner and a pre-wash applicant.

Hydrogenated coconut oil is an excellent ice cream coating. The product is also ideal for use in all types of confectionery including biscuit creaming, wafer filling and the sugar icing of cakes and pastries. It is extremely stable against oxidative rancidity and has a good resistance against fat bloom.

2.7.2.10 Virgin Coconut Oil

Virgin coconut oil is emerging as an ingredient in the preparation of natural personal care products. It is a major ingredient in soaps, lotions, creams, lip balms, etc. High quality variety of this oil makes an ideal massage oil for babies.

Virgin coconut oil is also made from the mild extracted form- raw kernel. This is done on a small scale by the traditional method which is now partially mechanized or on a large scale by adopting wet processing technology. It is defined as a naturally processed, chemical-free and additive-free product from fresh coconut meat or its derivatives, which have not undergone any further chemical processing after extraction. Virgin coconut oil is rich in Vitamin E. Virgin coconut oil is emerging as an ingredient in the preparation of natural personal care products. High quality variety of this oil makes an ideal massage oil for babies. It has a longer shelf life than coconut oil extracted from copra. Virgin coconut oil has also been found to be a rich source of monolaurin, an antiseptic substance found in mother’s milk.
2.7.2.11 Coconut Oil Cake

Coconut cake is the residue left after the extraction of oil from copra which is mainly used as a cattle feed. Coconut cake contains 4-5 per cent oil which is extracted by solvent extraction process. This oil is generally used for industrial purpose and de-oiled cake is used to make mixed cattle feed. There are a few such units in the country, especially in Kerala.

2.7.3 Products from Coconut Milk

2.7.3.1 Coconut Milk

Coconut milk is a creamy rich smooth flowing liquid extract from the fresh mature coconut kernels. Fresh coconut milk has many applications in households and food industries.

2.7.3.2 Coconut Honey

Another value added product prepared from coconut milk is coconut honey which is an excellent substitute for real honey in many household and confectionery applications. The product is a golden coloured thick paste with a nutty flavour. Besides its use in preparation of household and confectionery food items, it is an excellent bread spread and a base for soft drink.

2.7.4 Products from Coconut Water

2.7.4.1 Matured Coconut Water

Coconut water or milk is an excellent natural soft drink for all. It is useful for diabetics and heart patients. It is very useful to people suffering from diarrhea and vomiting. It helps in increasing blood circulation in the kidneys. According to Ayurveda, coconut water has the properties of “expelling heat from the body”, thus giving a feeling of freshness which is due to its ability to balance the body’s electrolytes. Coconut water is also considered a good antidote to powerful drugs administered to critically ill patients.
The major chemical constituents of coconut water are sugars and minerals and minor ones.

Sugars: Sugars in the form of glucose and fructose form an important constituent of the tender nut water.

Minerals: Tender coconut water contains most of the minerals such as potassium, sodium, calcium, phosphorous, iron, copper, sulphur and chlorides.

Protein: Coconut water contains small amounts of protein.

Vitamins: Tender coconut water contains both ascorbic acid and vitamins of B group.

2.7.4.2 Tender Coconut

Tender coconut is a very delicious refreshing nutritious drink. The water of tender coconut, technically the liquid endosperm, is the most nutritious wholesome beverage that nature has provided to the people of the tropics to fight the sultry heat. It has caloric value of 17.4 per 100 gm.” It is unctuous, sweet, increasing semen, promoting digestion and clearing the urinary path,” says Ayurveda about tender coconut water.

Numerous medical properties of tender coconut water reported are:-

a) Good for feeding infants suffering from intestinal disturbances.

b) Oral dehydration medium.

c) Contains organic compounds possessing growth promoting properties.

d) Keeps the body cool.

e) Application on the body prevents prickly heat and summer boils and alleviates the rashes caused by small pox, chicken pox, measles, etc.

f) Kills intestinal worms.

g) Presence of saline and albumen makes it a good drink in cholera cases.
h) Checks urinary infections.

i) Cures malnourishment

j) Diuretic


l) Can be injected intravenously in emergency case.

m) Found as blood plasma substitute because it is sterile, does not produce heat, does not destroy red blood cells and is readily accepted by the body.

n) Aids the quick absorption of the drugs and makes their peak concentration in the blood easier by its electrolytic effect.

o) Urinary antiseptic and eliminates poisons in case of mineral poisoning.

“It’s a natural isotonic beverage with the same level of electrolytic balance as we have in our blood. It’s the fluid of life, so to speak”, says Mr. Morton Satin, chief of FAO’s Agricultural Industries and Post Harvest Management Service.

Tender coconut water and matured coconut water with various minerals and vitamins and natural drink as well as enriched natural drink can have a wider market both at domestic and international level.

2.7.4.3 Nata de-coco

Nata de-coco is a gelatinous product prepared from matured coconut water/ coconut skim milk by the action of cellulose forming bacteria and offers very good demand in countries like Japan, Taiwan and Korea. Nata could be used for making sweetened products and as an ingredient in desserts and fruit cocktails.

2.7.5 Husk Based Products

The husk is 35% of the mass of the coconut melon. It is comprises about 67% pith, a lignin which behaves like a phenolic resin, and 33% fiber, also made
from lignin but with a fibrous morphology. The pith and the fiber can be used in agricultural applications, since they absorb water about ten times their weight. Furthermore, the pith and fiber are biodegradable, enriching the soil much like peat or mulch, for which they may be substituted. Recent studies in the Netherlands support the idea that the husk can be hot pressed into particle board directly without adding any additional binder. The pith can apparently chemically react and consolidate much like a phenolic resin, with the fibers serving as reinforcement. Particle board in developing countries is usually in high demand and commands an excellent price.

2.7.5.1 Coir

Coir is one of the most important natural hard fibers of great commercial interest in the world market. Fiber from the husk is used in the manufacture of coir ropes, mats and mattings. The traditional application for coir is a padding material for furniture. Other uses are for the production of brushes, carpets and rags and twines.

Coir is also used for plant pads which are natural substitutes for sphagnum moss, plastic redwood and other containers for growing various kinds of outdoor plants. In the industrial field, coir has also found application as geo textile material in the form of bonded mats, filtering materials for drainage, wallboards, in the construction of industry and briquettes. They are also used in laying roads in water logged conditions, control landslides, etc. Coir is also used as insulation material, caulking material for boats, filtration pads and as carpet underlay.

The more important utilization of coir is for the production of car panels in the form of car seats, back pads, ceiling and other car parts. For this purpose, coir is transformed into rubberized sheets. Rubberized coir sheets are also suited for packaging scientific photographic, electronic and other delicate equipment and products as they offer excellent protection and safety.
The largest market for rubberized coir is the automobile industry. Coir is used as seat panel padding for Mercedes Benz and Volkswagen.

In recent years, coir dust, a residual non-fiber particle which is produced from the extraction of coir, has gained economic importance. While it is used to be a major problem for decorticating plants because of the volume involved in disposal and because of environmental considerations coir dust is now exported and used as substitute for peat moss, soil mulching, soil conditioning agent and other uses.

2.7.5.2 Coir Pith

Coir pith, a waste product obtained during the extraction of coir fiber from husk is very light, highly compressible and highly hygroscopic. It is used as a soil conditioner, surface mulch/rooting medium and desiccant. Composted coir pith is an excellent organic manure for indoor plants as well as for horticulture crops. Several firms are manufacturing composted coir pith in the country. Compressed coir pith in the form of briquettes for easy transportation is also manufactured in the country. India is the largest producer of brown coir fibre and its production has steadily increased during the last five years.

Coir is one of the important natural, golden colour, hard fibres extracted from the husk or fibrous mass (mesocare) covering the coconut. It is of great commercial interest and falls under the category of industrial hard fibres such as hemp, abucca, henequen, etc. Coir has certain unique qualities, such as resistance to spoilage due to moisture and dampness. Coir fibres possess remarkable durability to withstand physical strength and hence it is a renewable resource for manufacturing various floor covering and other coir products. In India coir fibre is extracted from coconut husk after retting in saline water and also by deploying fibre extracting machine. Mechanical extraction of coir fibre requires dry husk and is widely used in coconut growing states in the country owing to better realization of coir fibre, cost effectiveness and overall inadequate retting facilities.
The white fibre sector has become stagnant over last few years, where as the export requirement is mainly of white fibres products. The coir industry is mainly concentrated in the coconut producing States, viz, Kerala, Karnataka, Tamil Nadu and Andhra Pradesh in the southern region and Orissa in the eastern region. The industry’s strength lies in the export oriented coir products manufactured in the country.

It has been reported that there were 6531 functional coir processing units in the country out of which 5124 units are in Kerala, 217 units in Karnataka, 262 in Tamil Nadu, 265 in Andhra Pradesh, 100 in Orissa, 75 in West Bengal, 5 in Maharashtra, 6 in Pondicherry and 3 in Goa. Consequent upon the mechanization in the coir processing sector in Kerala, production of brown fibre has increased manifold. A new retting process using coir ret, a bacterial culture developed through research by coir board has become popular in Kerala. The fibre is called green husk fibre which is mixed with white fibre to make coir yarn and other products.

2.7.6 Products from Coconut Shell

Coconut shell is a natural product made of hardened cellulose. Like the coconut oil, the coconut shell also has exceptional properties. It has a specific gravity of 1.2 which is about twice the density of hardwood. It is at least twice as hard as hardwood and is also very rich in energy. The hardness of the coconut shell is comparable to lower strength aluminum alloys, making it one of the hardest organic materials produced in nature. It can be ground into 50-micron chips to be potentially used as reinforcement for engineering plastics. Chopped glass fibers are conventionally used as reinforcement to increase strength and stiffness and reduce cost in polymeric composites.

Ground coconut shell is not as hard as glass, but it bonds much better to the matrix, since the bond interface will be organic to organic, rather than organic to silicon oxide. Because of its high mass-density, coconut shells also have a high energy-density. This means that they may be burned as fuel for cooking or used to make charcoal. Burning directly as a fuel would make more sense in the
village, while sales to cities would be in the form of charcoal. While the burning of 10 kg of wood produces only one kg of charcoal, 10 kg of coconut shells produces 3.5 kg of charcoal and 5.5 kg of combustible gases.

Shell charcoal, shell based activated carbon, shell powder, shell handicrafts, shell ice-cream cups and bear glasses, ladles, forks, showpieces, shell buttons, etc. are available in the country. Activated carbon processed from the charcoal of coconut shell is used to remove toxic gases, thereby helping pollution control.

2.7.6.1 Coconut Shell Powder

Coconut shell powder, manufactured from mature coconut shells, is extensively used as a compound filler in synthetic resin glues, as filler and extender in the manufacture of phenolic moulding powder, for specialized surface finishes and as filler in plastic products, mastic adhesives, biluminous products, mosquito coils and agarbathis.

2.7.6.2 Coconut Shell Charcoal

Coconut Shell Charcoal is perhaps the most sought after product among the coconut by-products due to its extensive demand in the manufacture of activated carbon. Coconut shell charcoal is also used as culinary fuel, as a fuel in smitheries, for smelting of gold and silver and as a furnace fuel in iron and steel industries.

2.7.6.3 Activated Carbon

Activated carbon refers to any form of carbon that has a very large surface area and the ability to accumulate substances at the surface. Coconut shell based activated carbon is the most superior one for gas adsorption because of its small pore structure of below 20 Angstroms and its high mechanical strength.
2.7.7 Products from Coconut Wood

The coconut wood because of its distinct grain characteristics is ideal for making wall panels, furniture, doors and windows, showpieces, etc. There are several small scale units manufacturing a variety of articles from coconut wood. The trunk, otherwise called ‘porcupine wood’ is used in house construction and furniture making.

2.7.8 Leaves

The leaves after plaiting are used for thatching houses, for covering retting pits, making partition, wales for separating different lots of husks retted in linear trenches for making baskets, etc. Plaited leaves are also made into several types of head-gear and are worn by poor men and women while out in the field. Unplaited coconut leaves are also used for shading seedlings, mulching nursery beds and for fencing, etc. The dry leaflets are tied into small bundles and used in villages as country torch in the night.

2.7.8.1 Midribs of Leaves

The midribs of leaves are utilized for making brooms, baskets, fish traps, petioles, bunch stalks, spatues, stipules, etc. These are mostly used as fuel.

2.8 Conclusion

In beauty and utility, coconut crop surpasses all other crops. The crop is gaining world wide acceptance not only as a food, beverage and oil seed crop but also as a renewable source of raw material for diversified uses. There are many reasons for giving protection for coconut farmers. Most of the farmers, almost 98 per cent, have very small holdings. There is also very high sunk cost-already having planted coconut and investing for 3-4 years, it is not easy to change the crop like onions or tapioca. Coconut production provides high utilitarian value, especially useful for poor households. It also enables eco-friendly cultivation and provides natural products. Also there seems to be high medicinal and herbal value
of the coconuts and their products. It has also highly religious uses. These are the reasons why one has to be protecting this particular sector in the country.

Coconut industry in the country at present is on a revival path for product diversification and value addition. The coconut has been a growing success since the time it was first discovered and to this day this very diverse plant is showing great potential. “Our thanks to the Divine Providence which made this tree well worthy of the title of the king of vegetable, with its sap, its fruits, its leaves its stems, its roots and all its parts, to feed appease, shelter, cure and carry mankind”. Jose ‘Maria de Sa’ Lisbon 1908.

**Notes and References:**

3. Ibid p27.
4. Ibid p28. (As per personal discussion with the author.)
8. Food and Agricultural Organization, Statistics Citation.

