Coconut

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The Coconut Palm – Tree of Life

The coconut palm (Cocos nucifera, L) is commonly called the "Tree of Life" because of its myriad uses. All parts of the palm, from the roots to the leaves and particularly its fruit, have special uses as a provider of food, beverage, shelter, animal feed and as an important raw material for various industries like the oleochemical industry. Traditionally, it requires little attention throughout its life span of over 50 years, thus the reference as a "lazy man's crop". Commercial farms, however, are tended and developed for improved productivity. The coconut palm reaches a height of 20 metres or higher for the tall varieties, while dwarf varieties grow up to 3 metres upon maturity. The palm is propagated through seednuts, normally from elite parents. These are stored in a shade to germinate in loose and friable soil provided with adequate moisture and drainage facilities. The sprouted seednuts are transferred into polybags to allow proper selection of seedlings. Furthermore, the seedlings in polybags are protected from shock and other damages when transplanted in the fields.

Traditional varieties start bearing fruit in the sixth year from field planting. However, new hybrid varieties developed by Philippine coconut breeders start bearing fruit as early as the fourth year. A method of mass propagation of elite coconut palms is being made possible by tissue culture, where progress has been reported with very encouraging results.

The Coconut

The fruit of the coconut takes 12 months to develop from flowering to maturity. The common mature coconut weighs more than 1 kilogram and is ovoid in shape. Young coconuts are green in colour and turn brown as they mature, although there are those which are naturally yellow in colour. The coconut itself is composed of an outer layer called the "mesocarp" (coconut husk) which covers the hard layer called the "endocarp" (shell). Within the shell is the "endosperm" (kernel, meat) of about 1-2 centimetres thick. A thin brown layer called the "testa" (paring) separates the kernel from the inner surface of the shell. The cavity within the kernel has an average volume of 300 ml and contains the endosperm liquid called "coconut water".

The kernel is considered the most important part of the coconut as it is the source of various coconut products such as copra, coconut oil, desiccated coconut, coconut milk, coconut cream, coconut flour, protein powder and copra meal. The coconut water is a sterile liquid and is considered a healthy beverage capable of dissolving renal stones. The testa, which is pared off from the kernel during desiccated coconut production, is extracted of its oil which contains a fair amount of unsaturated fatty acids (C18:1 and C18:2).

The shell is converted into charcoal and is further processed into activated carbon. As raw shell, it is often used as material for decorative items, fuel in copra making or, when finely ground, serves as a filler for synthetic resin, glues and components in mosquito repellent coils. The husk is processed for coir fibre, rubberised fibre, rope, geotextiles and the dust by-product from coir manufacture is used as soil extender.

Of the products from the kernel, copra or dried coconut meat is the most widely traded commodity. This is because it is the feedstock in coconut oil extraction by the conventional mechanical extraction method. Apart from this, so far, no other method of coconut oil extraction is presently used commercially. Various copra drying methods are employed, such as sun-drying, direct fire-drying and hot-air drying. Drying reduces the moisture content of the kernel from approximately 50% down to 6-8%.

The trading of copra goes through a series of intermediate buyers. In the case of the Philippines, small volumes are sold either to barrio (village) traders or to town buyers who, in turn, sell accumulated truck loads of copra to oil millers.

About Coconut Oil

Coconut oil is by far the richest commercial source of lauric fatty acid from vegetable origin. It shares this distinction as a lauric fatty acid source only with palm kernel oil. This vegetable oil pair is thus called the "lauric oils". Although there are yet other vegetable oil sources of lauric fatty acid, such as babassu, cohune and cuphea, volumes are not of commercial quantity. Other vegetable oils traded commercially in the world market do not contain lauric fatty acid, which is why coconut oil is normally priced at a premium over these oils. Another peculiarity that sets coconut oil apart from other oils is its medium chain fatty acid (MCFA) components, fatty acids of 12 carbons or less, which have important application in nutrition and medicine. MCFAs account for 64% of the fatty acids in coconut oil. Although coconut oil is 92% saturated, it is low in melting point (24-27 degrees Celsius) because of its shorter carbon chain length and is easily absorbed, digested and utilised by the body as a preferred energy source. The saturated character of the fatty acids also accounts for the stability of coconut oil as it resists rancidity due to oxidation and other forms of degradation. Food processors who are aware of this good quality of coconut oil have given it a high preference in their formulations, particularly in products that require long shelf lives.

In the countries where it is produced, coconut oil is used mainly as a cooking oil or a frying oil. It is also an important raw material for margarine and shortening production. In the Philippines, a 90/10 blend of coconut oil/corn oil is used as a milk fat in filled milk formulations. In the non-food sector, the use of coconut oil is mainly for technical applications, as raw material for the production of chemical derivatives for the surfactant industry. These derivatives are the fatty acids and its salts, fatty alcohol, methyl ester, fatty amines and amides. For these applications, coconut oil is desired because of its high lauric acid content.

New Markets for Coconut Oil Products

The use of coconut oil in industry has advanced more recently. From the traditional food applications as spray oil in crackers and cookies to lengthen shelf life, or as cream fat in biscuit cream and confectionery oil, among others, the use of coconut oil in nutrition and medicine has now come about. Such products are derivatives from coconut oil like medium chain triglycerides (MCT), structured lipids and monoglycerides.

Medium chain triglycerides are obtained largely from the fractionated fatty acid of coconut oil. It is a preferred energy booster for athletes and geriatrics. MCTs in capsules are taken by athletes for increased endurance during athletic activities. MCT is also used today as a dietetic measure in patients with fat assimilation disorders. A number of medical and infant food formulations have MCTs as the principal source of fat supplemented with polyunsaturates. Structured lipid is a speciality fat which can be used as a healthier alternative to traditional fats in food product formulations. Most structured lipids currently manufactured use medium chain triglycerides of a lauric oil, supplemented by long chain triglycerides of a polyunsaturated oil. In commercial terms, structured lipids are medium chain lipids.

Coconut oil-based monoglycerides have a specific function as an anti-microbial agent due to their lauric acid content. Studies have shown that lauric acid exhibits anti-viral and anti-microbial activity. The anti-pathogenic action of monoglycerides has recently been providing much interest. Monolaurin, the monoglyceride of lauric acid, has been reported to have the highest anti-bacterial, anti-viral and anti-fungal activities and was found to have potential medical value for AIDS, tuberculosis, ulcers and other ailments. Likewise, monolaurin’s anti-microbial properties allow it to ideally function as an antiseptic, a disinfectant and, in lower concentrations, as a preservative for foods, cosmetics and drugs. Being sourced from plant material, the coconut monolaurin is a natural and non-toxic ingredient, making it a desirable preservative for the food, cosmetics and drug industries.

World Trade

World production of coconut averaged 9.65 million metric tons, copra terms (1992-96 average), which is equivalent to about 51.068 billion nuts. Of this total, close to 70% is supplied by the major producers viz. Indonesia, India and the Philippines. Of the three leading producers, the Philippines is the biggest supplier to world trade in the form of coconut oil, which accounts for some 80% of her total coconut production. Indonesia and India use the bulk of their production internally, both as food nuts and as coconut oil.

Coconut is widely traded in the world market in the form of coconut oil. Coconut oil accounted for 6.39% of world vegetable oils market during the 90’s.