

# Production of Neera and its value addition

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**A**mongst the 2000 odd palm species in the world, only nine species yield inflorescence sap (neera) / sweet juice and of these only four general species are found in India viz., coconut palm, date palm, palmyrah palm and sago palm. The coconut palm, popularly known as 'tree of life', is characteristically a food supplier from its fruit, inflorescence and other edible products. India ranks first in the world in coconut production with a production of 15,840 million nuts from 1.94 million hectares. These Kerala has around 21.5 crore coconut palms and about 25 % of the palms could be spared for neera tapping.

Neera is a sweet juice or sap, obtained by tapping the unopened inflorescence/spadix of the coconut palm. The inflorescence of this palm is a source of many food products. Its unopened spathe can be tapped to produce inflorescence sap, while its fertilized flowers or fruits can be processed to produce coconut meat, milk, cream, oil, water, flour, desiccated coconut, chips and nata de coco. The sap can be processed into sap juice / drink, syrup, honey, crude sugar granulated brown sugar etc. In Philippines it is also marketed as an alcoholic drink (4.0-6.0 % alcohol) or as 'lambong' or distilled wine (24.0-45.0% alcohol).

## Season and stage for tapping

Tapping for extraction of neera is mostly done in the dry season extending from November to March and in wet weather period from April to October. Dry weather tapping is done mostly in the low lying lands where palms do not suffer due to moisture stress during drought period. The spathe is considered ready for tapping when the inflorescence opens or is just about to burst. The female flower within the unopened spadix causes a swelling at the base and this indicates the appropriate stage for tapping. Since coconut produces inflorescence regularly in the successive leaf axils, tapping can be done throughout the year. Neera can be extracted from tall palms, dwarf palms and the hybrids and out of these the hybrids followed by tall are found to be high yielders and most preferred.

## Tapping technique and collection of sap

The selected unopened spadix is wrapped with fibrous chord of coconut leaf petiole along its length to prevent it from splitting. Inflorescence suitable for tapping is trained and it consists of gentle uniform beating all over the surface using a hardwood mallet twice daily so as to carefully bruise and

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rapture the tender tissues of the floral branch. Approximately seven to ten centimeter of the tip of the spathe is cut off. After three days the surface appears moist due to oozing of juice. An earthen pot is just hung around the spadix to collect the oozing juice. The tip of the spadix is tied down with a string to a nearby petiole or leaf. The daily slicing of the tip of the spadix allows the sap to flow continuously and slicing is done once in the morning and evening. The finer the slice, the longer is the life of the spadix. The mouth of the receptacle is covered with a net to prevent the entry of insects, mice and lizards. The collected inflorescence sap is filtered through a sieve to remove the foreign particles.

The yield of sap gradually increases and when it reaches the maximum, the collection is made twice in a day. The flow of the sap from the inflorescence continues for about one month or even more. During this period, the second spathe is also brought into production.

The tapping is usually continued for a period of six months with a possibility of three spathes on the same tree being tapped at the same time. The maximum yield of neera is usually obtained during the third month after the commencement of tapping. On an average a palm yields about 1.8 -2.4 litres of neera.

In Philippines tapping is done twice a day. Harvesting of inflorescence sap can be done in the morning (taken before 8 am) for production of vinegar and in the afternoon (not later than 3 pm) for the production of sap juice, honey and sugar since sap produced in the afternoon is sweeter than in the morning. To produce sweet inflorescence sap, it is necessary that all tools and containers used should always be clean.

### **Preservation of the collected neera (inflorescence sap)**

Neera undergoes fermentation when exposed to sunlight. It first undergoes alcoholic and then acetic acid fermentation through microbial action. As the sap is highly perishable due to the natural yeast micro flora, the harvested sap should be immediately processed by pasteurizing for 10 minutes at 65 ° C in a large cast iron pan. This prevents the fermentation of the sap. Such hygienically prepared sap can be stored upto three days without any change in its quality. The commercial neera available in the market has an undesirable odour. Numerous methods are available for removing the odour, improving quality and shelf life of the extracted neera.

According to the method developed by DRDO, thermal processing of neera at a temperature of more than 95°C and reduction of thermal stress by addition of bio-preservative 'nisin' at a concentration of 10 ppm was found to enhance shelf life of neera. A foil based multilayer packaging material such as PET (Polyethylene Terephthalate) / aluminium foil was found suitable to the prevent adverse effect of light. In order to increase the product appeal, the suspended particles in neera were removed by centrifugation at 4000 rpm for 10 min. The product as such without any additive treatment as well as heat processing was stable up to 72 hrs. When the product was processed either by in-pack pasteurization or through retort pouch processing, the shelf life was about one year under refrigerated condition and 30 days under ambient conditions. Besides improving the shelf life various value added products can be made from neera.

### **Value Addition of Neera**

#### **1. Coconut honey or syrup**

Coconut syrup is obtained by boiling the sap under moderate to very slow heat until it becomes sticky. The sticky liquid is allowed to cool, and then poured into desired container. Honey can be stored up to one year in a refrigerator or freezer.

#### **2. Coconut sugar**

The production of coconut sugar is similar to honey except for the boiling to further reduce the water content. Constantly stir the inflorescence sap until the liquid thickens at 115 °C. Keep it on the flame until it becomes granular. Air-dry the brown sugar before packing.

#### **3. Coconut vinegar**

Vinegar can be produced either from inflorescence sap or from mature coconut water. Pour fresh sap in a wide large plastic container with clean-netted cover to allow aeration and prevent entrance of dirt and foreign objects. After about ten day's fermentation in well ventilated room, the sap can be harvested as vinegar. To maintain the quality of the matured vinegar (with at least 4% acidity), pasteurize it by heating for 5-10 minutes at 60-65 °C, allow the vinegar to cool before placing it in clean bottles and then cover tightly and seal. Vinegar has extensive use as a preservative in the pickle industry and flavouring agent in food processing sector. The natural vinegar has good export potential as compared to the synthetic vinegar.

#### **Nutritional properties of inflorescence sap**

Inflorescence sap is not only sweet and delicious, but also rich in carbohydrates with sucrose as the



major constituent and also rich in nutrients (table 1) ([http://www.drdo.com/pub/techfocus/april05/coconut\\_sap.htm](http://www.drdo.com/pub/techfocus/april05/coconut_sap.htm)). The drink has an agreeable flavour with high nutritive value and medicinal properties and is a potential competitor to the soft drinks. It is wholesome, cool and good for improving general health, especially as a supplement to those with iron and vitamin deficiency. Inflorescence sap has medical applications for asthma, anemic and leprosy patients and is reported to improve appetite and digestion.

*Table 1. Nutritional properties of neera (per 100ml)*

Total solids (g)	15.2-19.7
Sucrose (g)	12.3-17.4
Total ash (g)	0.11-0.41
Ascorbic acid (mg)	16.0-30.0
Protein (g)	0.23-0.32

Inflorescence sap contains high amount of glutamic acid (glutamate), which is the amino acid used by the body to build protein. It is the most common neuro transmitter in the nervous system. The sap also contains various vitamins; of which inositol is the highest. It functions in nerve

transmission, regulation of enzyme activity and transportation of fats within the body. It also helps to reduce high cholesterol and is important for the heart. Inositol is also beneficial for the treatment of eye abnormalities, eczema and some cases of obesity.

### Economical benefits

Coconut farmers in Kerala are preparing to market "neera" (unfermented inflorescence sap) as a replacement for soft drinks produced by multinational companies. According to Mr. P.K. Thampan, Retired Chief Coconut Development Officer, Coconut Development Board a profit of Rs 1.75 per litre can be made by the grower on sale price of inflorescence sap@ Rs 4.50 per litre. The government could recover revenue of Rs. 3000 crore per annum from 5 crore palms used for tapping by levying a tax of Rs. 1 per litre of toddy.

### Social benefits

Amidst the prevailing shortage of coconut climbers, farmers are favouring the dwarf and hybrids and these could be suitably utilized for extraction of neera and for such purpose the rural youth could be

trained thus providing them with employment. The development of technology on food products from inflorescence sap has opened additional job opportunities among coconut based farming communities. The neera based food products are proved to be highly acceptable in terms of their nutritional and economic values. The processing technology is simple and easy and it offers greater opportunities for farmers to increase their income and also generates employment opportunities especially to family members. Moreover economical potential of the palms are maximized through processing of high value neera based food products without sacrificing the traditional products from coconut.

Taking into account the vast market potential of 'neera' (unfermented inflorescence sap), Government should take measures to accede to farmer's demand for their right to tap and market neera. A favourable decision in this regard will definitely benefit the coconut farmers and make coconut farming more competitive, which is otherwise losing its market to cheaper oils.

## Coconut Pests

### The Red Palm Weevil (*Rhynchophorus ferrugineus* Fab)

The damage is caused by the grubs which spend all their life time inside the palm, feeding on the soft tissue. The female weevil is usually attracted to those palms which are injured either by the rhinoceros beetle or by other means for laying eggs. The grubs, on hatching out, bore into the soft tissues of the stem or crown for feeding and finally cause the death of the affected palm. The crown of the palm crumbles without the manifestation of any outward symptoms of attack, since the grubs continue to remain inside the stem or crown, it is usually difficult to identify the infested palm. However the attack of the pest can be visualized by noticing the presence of holes on the stem with chewed fibrous material, some times protruding. A reddish brown liquid can also be found oozing out of these holes. At this stage of attack, if the grubs are destroyed completely, the affected palm can be saved. When the attack is on the crown, the wilting of the central shoot can be noticed. Timely detection and proper curative treatments are the essential steps in the management of this pest. A combined adoption of cultural, sanitational and chemical methods are recommended for the control of this pest. Sanitational and cultural methods include periodical cleaning of the crown, cutting and burning of pest affected dead trees for destroying all stages of the pest to prevent the spread of the weevil to neighbouring healthy palms. When leaves are cut from the palms, stump of not less than 120 cm may be left on the trees to prevent the laying of eggs by the weevils. The affected palms in early stages of infestation can be saved by injecting 0.1% endosulfan / dichlorvos or 1% WP in 1 litre/ palm, using a funnel. When the infestation is on the crown, clean the crown and slowly pour the insecticidal suspension. When pest entry is through the trunk, all the holes on the stem may be plugged with cement. Fresh coconut log traps with fermenting toddy and pineapple or sugarcane activated with yeast or molasses can be set in coconut plantation to attract and trap the weevil.