



How to bottle coconut water

A simple cold preservation process keeps bottled coconut water fresh for up to three weeks...

The traditional method for extracting coconut water is extremely simple: 1) climb a coconut palm; 2) hack an immature coconut from the bunch; 3) trim off the husk and chop a hole in the top; and 4) drink the contents (steps 3 and 4 are best done on terra firma).

Among people in tropical countries with ready access to coconut palms - or access to fresh coconuts sold by urban street vendors - coconut water is renowned as a refreshing, highly nourishing drink with a delicate aroma and flavour. But, despite coconut water's potential as a competitor in the bottled beverage market, attempts to capture those qualities in a commercial product have been largely unsuccessful. Once exposed to air, coconut water begins to ferment, and rapidly loses most of its organoleptic and nutritional characteristics. To eliminate the risk of bacterial growth, commercial bottlers are forced to sterilize the product using high-temperature/short-time pasteurization (the same technology used in long-life milk), which destroys some of coconut water's nutrients and almost all of the flavour.

Now, after more than five years of research and testing, FAO has announced a simple cold preservation technology appropriate for small and medium-sized agro-industries that allows them to produce bottled coconut water which, under refrigeration, stays fresh for from 10 days to three weeks. That is long enough to satisfy domestic retail markets and to allow export to developed countries, where good quality coconut water is in growing demand. FAO is also finalizing publications on a more technologically sophisticated microfiltration technique for cold sterilization and a low-tech system that can be used by street vendors.

Training guide. The mid-range technology, developed in Jamaica in collaboration with the University of the West Indies, the Coconut Industries Board and the Scientific Research Council, is described in a new FAO training guide, *Good practices for the production of bottled coconut water*, to be published in



English, French and Spanish early in 2007. Says Rosa Rolle, an FAO food biochemist who coordinated development of the process: "While microfiltration can guarantee a commercially sterile product, it requires skills and investments that are often beyond the capacity of small and medium-scale processors. What we aimed for was a technology that is easier to implement and costs less, but ensures good quality and reasonable shelf-life in a convenient format that satisfies consumer demand for a 'natural product'."

Essentially, the cold preservation process involves filtration to remove particulates that might mar the coconut water's appearance, bottling under hygienic conditions and rigorous temperature control. But the guide points out that the coconut water processing chain - like that of any other food product - is only as strong as its weakest link. Good practices need to be applied at every step, from harvesting, loading and transporting to cutting, bottling and sale.

The starting point is selection of coconuts suitable for processing. Key considerations are the variety - e.g. Jamaica's Maypan hybrid tree yields larger volumes of water than other varieties - and the fruit's stage of maturity: maximum yields of water, of around one litre, are consistently obtained from nine-month old coconuts. Quality also depends on how carefully the coconuts are harvested. Bunches should be

lowered to the ground with a rope, not cut and dropped, to avoid the risk of cracking the internal shell (studies at the University of the West Indies show that water collected from coconuts that had been dropped from a height of 8 m suffered high levels of spoilage).

The guide points out that "coconuts are living material", and continue to breathe after harvest: "The higher the temperature of a coconut at harvest, the more rapidly will it respire in the post-harvest phase and the more rapidly will its constituents undergo physiological changes, leading to deterioration." A range of other factors can negatively affect the quality of coconut water. During production, they include contamination by pesticides residues, and heavy metals entering the fruit through soil or water. Post-harvest, micro-organisms can be introduced through improper handling and processing.

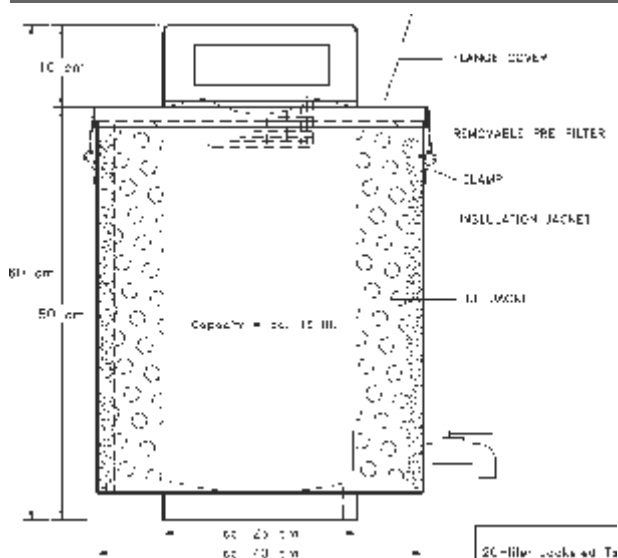
Even under ideal conditions, water should be extracted within 24 hours of harvest. During inspection, poor quality coconuts - those with cracks, cloudy water or a rancid odour - should be rejected, while those of good quality need to be kept on clean surfaces to avoid contact with soil and chemical agents, and stored away from the sun. Selected coconuts should then be washed in potable water and sanitized in a 1% bleach solution for at least 15 minutes. Finally, the coconuts should be transferred to a clean surface, off the ground, and air-dried.

Rapid cooling. Now comes the easy part: extracting the precious liquid. That is done by first trimming the husk with a sanitized stainless steel cutlass, then opening the shell. The water inside is decanted into a sanitized container equipped with a strainer lined with a sanitized silk screen or cotton cloth. The filtered water should be promptly transferred to a cooling tank and cooled to 4 degrees C, or placed in a freezer for three to four hours. Where large volumes of coconut water are to be bottled, a refrigerated cooling tank is highly recommended. Waste material - mainly husks - must be removed from the processing environment and discarded.

The water must be quickly bottled and sealed - in bottles that have been rinsed in potable water and sanitized for 15 minutes - then stored in a chiller at 4 degrees C. The bottling facility needs to be clean and physically separate from area where the coconuts are cut open.

"Bacteria and yeasts are the main micro-organisms that threaten freshly bottled coconut water," the FAO guide says. It is critical, therefore, that the temperature of the bottled water be kept at between 0 and 4 degrees C during transportation. Finally, the manual advises, processors need to make sure that their product is handled with care after delivery: "Monitor retail outlets to ensure that the bottled coconut water is stored at the correct temperature and away from direct light".

New processing technology for street vendors, too



Two familiar sights in many tropical countries are coconut water vendors hauling piles of fresh coconuts - and mounds of empty husks discarded in the street after use. Now, along with its medium-scale cold processing technology, FAO has developed a mobile freezing unit for street vendors that keeps coconut water fresh for 24 hours. Designed in collaboration with the Philippines' Intermediate Technology Development Institute, the unit is insulated with a mixture of ice and salt, which cools freshly collected coconut water to below 4 degrees C. Instead of hauling coconuts from rural areas into cities, vendors can collect the water "at source", reducing both their transport costs and the quantity of urban garbage.

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