

Coffee: The Long Journey of a Little Bean

Don Mercer

**Associate Professor, Food Science
Kemptville Campus University of Guelph**

It's something that many people just can't start the day without. Coffee has been savoured for over six hundred years and its popularity does not appear to be waning. One has only to look at the line of cars at the drive-thru windows of local coffee shops or the abundance of up-scale coffee establishments in most major cities to see just how important this beverage is in our lives. In spite of its popularity as a kick-start to the day or a relaxing break from the stresses of a work-day, very few people probably ever stop to think of how the coffee actually got to them.

The journey of the tiny coffee bean from far-away plantations to your cup or mug is really a fascinating story.

Coffee plants are evergreen bushes that can grow to fifteen feet high if they are not pruned. The coffee bushes that I've seen were about six feet high and were arranged in neat rows along the terraced slopes in the somewhat mountainous northern portion of Malawi. The fruit of the coffee plant is called a "cherry" and is bright red in colour when mature - hence the name "cherry". Coffee "beans" as we know them are actually the seeds of the coffee plant. There are usually two beans inside each coffee cherry.

Ripe coffee cherries are hand-picked and are either processed on-site or sent from the plantations to a central processing facility. On-site processes are usually small, labour-intensive, manual operations. In comparison, regional coffee cooperatives tend to have larger, more developed facilities. The cooperative I am about to describe was a masterpiece of simplistic elegance (at least in the eyes of this food processing engineer). It was built into a hillside and, with the exception of one small gasoline-powered engine, the entire process was driven by gravity plus the inputs of a few workers.

Water from a mountain stream was diverted into a large tank about the size of an above-ground swimming pool at the upper-most point in the process. This insured a steady supply of water during the most critical part of the process - the cherry pulping step. There was also a smaller tank nearby into which the ripe cherries were dumped when they were ready to begin processing. It was at this point where the true creativity of the process began to appear.

Coffee growers would bring their cherries to a kiosk at the start of the process. The bags were weighed and a receipt for them issued. Bags of ripe coffee cherries were then dumped into the smaller of the two tanks which not only served to introduce them into the process, but also performed an important sorting task. Any cherries that were overly ripe or under-developed would float on top of the water, along with any bits of

twigs and leaves that got into the bags at the time of picking. Fully ripened cherries and those that are slightly under-ripened are more dense than overly ripe cherries, and sink to the bottom of the tank. By drawing the water from the top of this tank, the poorer quality cherries and debris were removed prior to the pulping operation. The under-ripe cherries are rejected during the pulping step.

The pulping machine is the only powered piece of equipment in the entire process. A flow of water from the large “head-tank” moves the cherries that have sunk to the bottom of the smaller tank into the pulping machine. As they enter, the soft pulp on the ripe cherries is disrupted and the two seeds or “beans” inside each cherry are released. The fleshy pulp is flushed out one side of the pulping machine. The beans which are covered in slippery mucilage are removed from its other side. Any under-ripe cherries that happen to be present are too hard to be pulped. They simply pass right through the pulping machine where they are collected.

After they leave the pulping machine, the beans are carried by water flow into a concrete channel that follows a series of switch-backs down the hillside. At the start of the channel is a set of small dams over which the water flows. The best quality beans are quite dense and sink to the bottom behind the first dam. Lower quality beans, being less dense, are carried over the dams by the water. Once separated, the mucilage-covered beans are diverted into various large concrete tanks (about 3 feet by six feet by five feet deep) based on their quality. It is in these tanks that a natural fermentation occurs to remove the mucilage. After about 24 hours or so, the progress of the fermentation is tested by inserting a long stick into the tank of fermenting coffee beans. Once the contents of the tank have thickened sufficiently that an indentation is left when the stick is removed, the fermentation is complete.

The tank of fermented coffee beans is then drained by opening a valve and allowing its contents to flow out the bottom into the lower leg of the concrete channel that delivered the mucilage-covered beans to the inlet side of the tank. These beans are then held in the concrete channel by a second set of dams and are stirred continuously by workers using wooden paddles and pushers. During this agitation, any residue from the fermentation process is washed off. Waste water is collected in ponds at the bottom of the slope where suspended solids settle out before the water is used for irrigation of crops, or rejoins the original mountain stream.

When the beans are considered to be sufficiently clean, the dams holding them back are removed. Water then carries the beans to a screening area where they are collected and removed from the water in preparation for drying. Drying is accomplished by spreading the beans on raised mats. When there is a threat of rain, the beans are covered to protect them. After about two weeks, the dried beans are bagged and sent to a central facility for dehulling, followed by roasting or sale as green beans.

Out of curiosity, I counted 3,739 beans in a one-pound bag of coffee purchased at a local supermarket here in Canada. Considering that each coffee cherry contains only two beans, this means that nearly nineteen-hundred coffee cherries had to be hand-

picked, pulped, fermented, cleaned, dehulled, and roasted for my single bag of coffee. On top of this, these beans also had to be transported thousands of kilometres from their distant point of origin to Canada.

The next time you head to the drive-thru and order your “extra-large, double-double”, you may want to pause and give some thought to just how much work was involved and how far those little beans had to travel to bring your coffee to you.



The coffee beans travel down the concrete channel and are directed into one of these concrete holding tanks where the mucilage is fermented.



Workers are shown washing the coffee beans in clear water after the fermentation step.