

Biotechnology could remove dirty feet from Uganda's beloved beer

Mwenge bigere, also known as tonto, is a traditional Ugandan fermented beverage that translates as feet beer. Feet beer gets its name from how it is processed: stomping the juice out of overripe bananas sitting in a pit for several days. Uganda is one of the leading banana producers in the world.

Of several banana varieties, there are those specifically for making beer. It's made out of the juice squeezed from the banana that has ripened in a pit for several days. The juice extractors, who are mostly men, step on the bananas with bare feet, squeezing out the juice. The juice is then mixed with sorghum cultured yeast to finish the work—delivering an alcoholic drink enjoyed by a number of communities in central and western Uganda.

The process needs to be fast before other chemicals in the fruit set in to “lock” the juice from coming out. The “banana dancers” occasionally shout the process is “dying” to spur them to work more quickly. The more the juice, the more alcohol they would expect. The “dying” or gelling of the pulp before maximum amount of juice is squeezed out is due to the high pectin concentration in banana. The other disadvantages of the traditional method are that it is labor intensive, has high chance of introducing microbial contaminants thus reducing the shelf life of juice and there is loss of the banana flavor.

Why biotechnology

This enzyme based process for extracting juice from the banana apart from tripling the amount of juice the traditional method of dancing in ripe banana would give, has also helped remove the not so pleasant reality of taking a drink made by a sometimes dirty feet.

The innovator, Samuel Kamya, who is supported by the Microbiology and Biotechnology Centre in the product development department at the Uganda Industrial Research Institute, says this innovation is so simple that one can produce the products from a school dormitory. He uses enzymes (Fruit-zyme) derived from certain bacteria and fungi. The enzymatic treatment also has the advantage of increasing the overall sweetness of the juice. Because it breaks down pectin and other celluloses, it increases juice yield and reduces gelling.

Kamya says gelling due to pectin is a major hindrance in local extraction of juice. The enzyme extracts-based method guarantees a 75 – 80 percent yield of hygienic juice with prolonged shelf life. The unhygienic process and the little juice the traditional process could make inspired and motivated a young Kamya, fresh from school, to conceive of this novel approach. At a National Biosciences Conference where he presented his products to farmers and policy makers, farmers were surprised and amazed by how these ‘micro feet’ could help them make their beloved brew without relying on feet-squeezed juice. They would also not lose more than 30 percent of juice that would often go to waste using the traditional method.

Lactic acid is another product that could come from cassava but would require genetic engineering. Unlike banana juice extract that is maximized without having to modify microorganisms, in the production of lactic

acid from cassava only 50 percent of the lactic acid is extracted. Deborah Wendi, who heads the biotechnology department at the Uganda Institute of Industrial Research, says genetic engineering would definitely increase these percentage to more profitable levels.

Cassava is one of Uganda's major staples just after bananas and it contributes to the daily carbohydrate intake of most households in Eastern and Northern Uganda. Cassava is also used for making local gin, which employs many women. Most of the nutrients in cassava are thrown away as waste during the production process. The opportunity that biotechnology provides to cassava growers especially women who are the ones involved in distilling is that they could make more acceptable products than the crude alcohol that have wasted lives of many drinkers. Vinegar, lactic acid, and ethanol are some of the products that will offer rural women the opportunity to make these newer products.

Helping women

Brewing of most traditional drinks in Uganda are a preserve of women. In Uganda as in most parts of Africa, women do not have access to agricultural land. They grow "food crops" which are supposed to be used for daily consumption as men usually raise crops that are mostly market bound. This makes women resort to brewing local alcohol. Most of the substrates are wasted because of the low conversion rates and the limited products that they get. The option of using modified organisms which are efficient in producing lactic acid is key to answering to the plight of these rural women as summarized by one of the local beneficiaries who remarked, "I used to think all bacteria and all fungi are bad and that every acid is 'acidic'."

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