

## **Mangoes in Malawi**

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It all began with a casual conversation after breakfast as we walked to our car in the southern Malawi town of Mwanza in late July 2008. There was a large tree on the edge of the parking lot whose presence just commanded attention. My host, Jacob Mapemba, Country Director for the World University Service of Canada (WUSC) in Malawi, said that it was a mango tree and related how these trees grew naturally throughout his country. He went on to explain how each year when the fruit ripened there was a flood of mangoes on the market with very little commercial value.

Our discussion about the mango situation continued throughout the remainder of our three day trip. Fortunately, I had done some mango drying back in Kemptville as part of a paper a colleague and I had published on problems with mango drying he had encountered while on an assignment in Burkina Faso. In the end, Jacob convinced me to include a session about the potential processing of mangoes during a two-day workshop on value-addition and capacity building in their agri-food sector. To my delight, there was a high level of interest from those in attendance which strengthened my conviction to do some additional mango work upon my return to Canada.

Autumn 2008 saw frequent trips to the grocery store to buy mangoes for experiments on the effects of temperature, time, and air flow velocities on the drying of mangoes. An initial report to WUSC in Malawi received a somewhat lukewarm reception due to its overly technical approach, but that was only a minor deterrent. By this time, there was too much time invested in the project to abandon it.

A primary objective of the mango project was to design and build a simple dryer based on the information gathered from the drying experiments. This is where the actual “fun” began. In the Spring of 2009, the “Malawi Dryer” as it was dubbed began to take form in our garage. Made from half-inch thick plywood, it was far from glamorous, and the five-foot long wooden box looked nothing like a device for a series of experiments. Several coats of white paint helped spruce-up its appearance tremendously. After being outfitted with two heater fans to supply warm air through a pair of metal air ducts, and a bathroom exhaust fan to draw the heated air through the actual drying chamber, the “Malawi Dryer” was ready for its trip to the Kemptville Campus. This was done in the back of our van early one Sunday morning when the presence of prying eyes would be at its lowest.

Shortly after taking the dryer to the lab, I got word that Jacob and several others from WUSC in Africa would be coming to Canada in early October. They knew about the dryer wanted to visit Kemptville to see it. When they saw the “Malawi Dryer”, wheels start turning and ideas beginning to take form. Several dozen tests confirmed the

design would work and that the principles were sound - but the dryer was too small to be used on any commercial scale.

In mid-January 2010, an e-mail arrived with an invitation to come to Malawi and work on a short-term assignment to build a larger dryer which could be checked out with locally grown mangoes. This was too good to turn down and on February 10, I was flying out of Ottawa on my way to Malawi.

The first thing any visitor from Canada notices about Malawi in February has to be the temperature and humidity. 28°C, with over 70% humidity, and rain several times each day is a definite change from even the mild temperatures we've had this winter. Even though the air was quite warm, its high moisture content made it unsuitable for drying anything without being heated first.

Working with a two technicians and two carpenters at Bunda College was a most pleasant experience. Within a few days, we had a large plywood box assembled that was eight feet long, by about three feet high, and just under three feet from front to back - a big brother for the "Malawi Dryer" back home. There were racks with fine-mesh chicken-wire stretched across them to support the sliced mangoes, plus internal features to ensure the proper flow of air.

However, one of the most significant items was missing. Nowhere in the capital city, Lilongwe, could we find heater fans to warm the incoming air. When you really think about it, who would ever need a heater fan when the temperatures were hovering in the mid to high 20's on the Celsius scale. Eventually, we found two room heaters similar to baseboard heaters in Canada, and a couple of extractor fans used to remove air from household rooms. The combination of these two key components lifted our spirits setting the stage for a series of preliminary tests just a few days before my scheduled departure.

Upon my arrival, there was a warning that this was the tail-end of the mango season in Malawi. Even though there would still be some mangoes available, they would probably be in short supply, and of course, they would definitely be expensive. The afternoon before our inaugural test run, we drove into Lilongwe to visit the local market. After a bit of bargaining, we were able to secure twenty-five large mangoes (rich in fibre, but low in sugar) and two dozen small mangoes (quite sweet, but low in fibre) for the sum of one thousand Kwachas. Doing some quick conversions into Canadian dollars convinced me that we got a good deal, even though the technicians with me were a bit upset about the high price we had to pay. Overall, forty-nine mangoes for about \$6.00 Canadian didn't really seem too bad in the general scheme of things.

Two days of testing proved the prototype mango dryer worked well, in spite of the jury-rigged heating arrangement. Everyone who tasted the dried mangoes was quite impressed with their flavour and chewy texture, which added to the joy of the assignment.

A supplier for heater fans has now been identified and plans are underway to produce several additional dryers for the mango harvest next year. With any luck, these field tests will be successful and an opportunity to produce a value-added product will be exploited.

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Mangoes growing on a tree in Malawi



The dryer built in Malawi