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The Solar Dryer in Wings for Buko Shells

The Solar Dryer in Wings for Buko Shells

THE CONTEXT

- The crisis for fuel continuously is causing massive deforestation in the country sides. The demand for wood charcoal remains high.
- Food business sector consume either gas or charcoal which are both very expensive and has high carbon footprints.







***buko** : the coconut at its young and green stage when the meat is soft and the water is sweet.*

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THE CONTEXT

- All the while, buko shells remain to be among the major contributors of biodegradable wastes in the urban centers. While urban residents have the penchant for consuming buko, the shells have to be hauled up and transported back to the sources and then dumped.



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THE CONTEXT

- Aside from the efforts and emissions created by the transport of the shells, the rain water that is trapped in the shells become breeding grounds for mosquitoes, thus add to the risks of dengue outbreaks.
- Drying in the open sun can be very discouraging. In the tropical climate of the Philippines, there could be sudden rains at any time of the day.



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- Objectives of the Project
 - To reduce the cost of fuel for cooking in the kitchen of Cravings Restaurant
 - To contribute to the reduction of wastes by the street buko business.
 - To enable the buko vendor reduce his efforts and expenses in disposing the spent shells.

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- The Design
 - This particular model is an expanded version of the previous works of the author. Past models cater mostly to the needs of the households, fish drying and the use of bamboo and cheaper materials .

Dryer in Wings for Buko Shells

The Design

This model was built upon the old configuration of the heat collector on the side and the upright shelf where the collected hot air rise up to collect the moisture and then an exit port at the top.

The author's contribution is the heat bank at the floor where a heat reserve is stored during daytime and slowly released at night time.

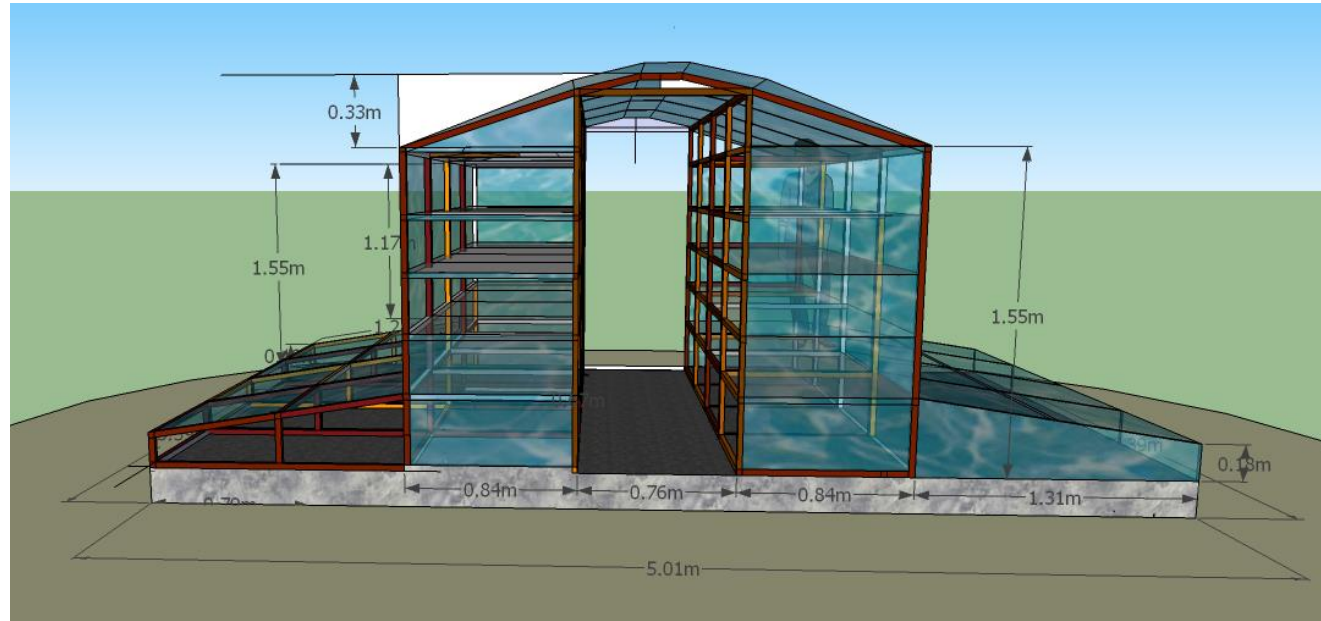


Dryer in Wings for Buko Shells

The Design

The basic module was expanded by having two modules opposite each other. Thus the shelves can be loaded and unloaded from the middle row.

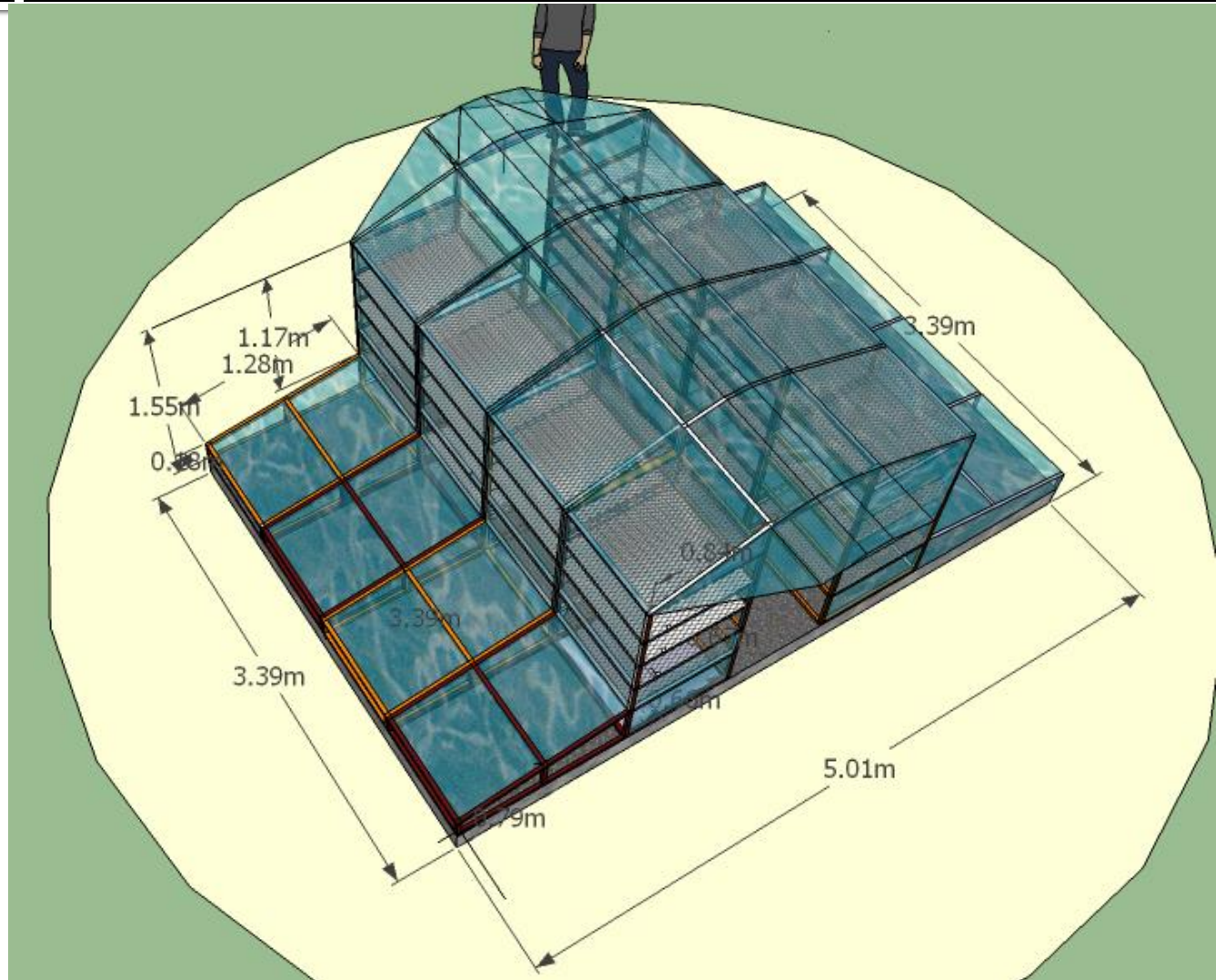
The hot moist air then escapes from the air vent at the top of the aisle.



Dryer in Wings for Buko Shells

The Design

Dimensions of this particular model are shown in this drawing.



Dryer in Wings for Buko Shells

Fabrication Stage

The CEF holds an access to a huge depot of recyclable materials coming from several branches of the Cravings restaurants in many parts of Metro Manila.

At the depot were dilapidated table legs made of metal angle bars. The angle bars were cut to size and rejoined.



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Fabrication Stage

The dryer was laid over a thick and raised layer of broken gravel and concrete blocks. The platform then serves as a heat bank which serves to extend the drying time at night or whenever there is less sunlight.



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Fabrication Stage

UV resistant plastic sheets were laid over the frames.



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Fabrication Stage

Fabrication took three weeks. Improvements on the fabrication techniques in the future would require hiring additional skilled metal workers and the use of table metal cutting equipment if metals of this volume will have to be cut.



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■ Results

- The dryer has thirty two (32) shelves that were built to hold the entire weight of the wet shells. Each shelf can receive one bag of shells.
- The shells would safely dry during both sunny and rainy days.
- Each *sako* of wet shells weigh an average of 25 kilograms thus a total load of eight hundred kilograms (800 kg) when fully loaded.

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RESULTS

- The tests were done between March and April when Philippines was under the El Nino episode.
- Buko shells at the top most layer would dry up in one week time. Those at the lower second and third shelves would dry up on the second week.
- From twenty five kilograms (25 kg) per bag, the weight of the shells would drop to four kilograms (4 kg). That is twenty one kilograms (21 kg) or 84 % water taken off.



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RESULTS

- It is now in use at milk caramelizing station of CEF. Six hours of fast boiling consumes six bags or the shells or an average of sixteen (16) kg every cooking.



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RESULTS

- In a few days, the same shells will be used for the braising station with another newly installed improved brick stove.





The Solar Dryer in Wings for Buko Shells

RESULTS

- The buko shells did not have to be chopped smaller.
- The author simply had to adjust the size of the fuel feeder of the brick stove to accommodate the large sizes of the shells when dried.
- *A separate report about the brick stoves will soon be available.*



The Solar Dryer in Wings for Buko Shells

OPERATIONS AND MAINTENANCE OF THE DRYER

- Everyday, the buko vendor delivers an average of three bags of the fresh shells from his stall which is on a street corner about fifty (50) meters away. The CEF provided a wheel barrow for his daily haul.
- He was able to reduce his cost of disposal of about fifty pesos (Php 50) daily and not having to bring the shells back home.



The Solar Dryer in Wings for Buko Shells

OPERATIONS AND MAINTENANCE OF THE DRYER

- The dryer requires cleaning of the plastic sheets to clean off the dusts and dirt that has accumulated.
- One day in every week, another worker would harvest the dried buko shells and then load up the fresh shells onto the shelves.





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- More Notes and Recommendations
 - The dryer was designed in a modular configuration, that is it can be expanded or reduced depending upon the needs of the user.
 - It is hereby recommended that this technology and experience be promoted all over the country wherever there are buko shells from the side streets.

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- More Notes and Recommendations
 - This is a solar dryer which can dry anything that would fit inside the shelves. It is further recommended that the same technology be used for drying food products including fuel briquettes, wood sticks as well as fish. Laundry business can reduce their cost of drying clothes using this technology.

Dryer in Wings for Buko Shells

The author, designer and fabricator of the dryer. Looking forward as the routine will soon break grounds for the CEF and the kitchen of the Cravings Restaurant.



