

2 - for - 1 ECO-KALAN BINGKA OVEN

I) 2 FUELS FOR 1 STOVE: COCONUT SHELL CHARCOAL OR WOOD (IPIL-IPIL) (*Leucaena leucocephala*)



STANDARD ECO-KALAN



CHARCOAL



FIREWOOD

II) 2 COVERS WITH CHIMNEY FOR 1 BINGKA OVEN BOTTOM



BINGKA OVEN BOTTOM ↑



2 DIFFERENT OVEN COVERS FOR CHARCOAL & WOOD FUEL ↑

FUEL: WOOD ↓

↓ FUEL : COCONUT SHELL CHARCOAL ↓





COCONUT SHELL CHARCOAL FIRED



IPIL IPIL WOOD FIRED

IV) DIFFERENT PARTICULATE EMISSIONS



OVEN & COVER AFTER 4 HRS 50 MINS OF FIRING WITH CHARCOAL



OVEN & COVER AFTER 4 HRS 25 MINS OF FIRING WITH WOOD

CHARCOAL FIRED: ₱ 654.60 pesos (Php); (US \$15.22)

WOOD FIRED: ₱ 698.20 pesos (Php); (US \$16.24)

The profitability of Bingka Especial is high compared to the daily wage rate of a domestic helper of ₱ 100 pesos + 3 free meals per day.

VI) PREFERENCES

CITY & PERI-URBAN AREAS: CHARCOAL FIRED OVEN

RURAL & REMOTE AREAS: WOOD FIRED OVEN

VII) BAKING PERFORMANCE TESTING AND DEMONSTRATIONS

Although the Bingka Oven is named after a Philippine native merienda favorite, it is able to perform over a wide range of cooking temperatures (325 °F - 500 °F) for a variety of foods because of the ease with which the oven temperature can be regulated. So far we have tested the Bingka Oven with BINGKA & TORTA (native breads with or without fillings) but will be testing with CAKES, COOKIES, PIZZAS, LASANGA, MEATS, POULTRY, FISH, CASSEROLES,ETC in the near future. At this time we have not yet produced ovens for distribution. All our testing is done at Felipa Beach in Mangnao, Dumaguete City, Negros Oriental. We have demonstrated the Bingka Oven during the Lakbay Aral (Educational Tour) Program for school children and their parents, teachers, barangay (local government) officials and their escorts from the Philippine Army, Philippine National Police, Catholic Diocese of Dumaguete and NGO members of ONCAN (Oriental Negros Children's Advocacy Network). These stakeholders are interested in delivering livelihood programs to poor and remote mountain communities where there are active insurgencies. Our first oven demonstration at Felipa Beach was given to the Lakbay Aral group from Sampiniton, Manjuyod, Negros Oriental. (See photos below).



Our one and only spare Bingka oven was donated to the Sagay Eco-Kalan Kitchen and Feeding Center in Sitio San Pedro, Old Sagay, Negros Occidental on August 16, 2014 for the Center's livelihood program. The Eco-Kalan Project established the Kitchen and Feeding Center in response to the devastation brought about by Typhoon Haiyan in November 2013.



Eco-Kalan Kitchen in Sagay

Watchful little eyes waiting for the bingka! Fuel: Coconut shell charcoal

Our first commercial production in October will be targeted to the bakers in Dumaguete and nearby towns who make bingka, torta and other baked goods using the traditional hornohan below. The Bingka Oven will provide the traditional bingka makers with a smoke free and cooler environment to work in and significantly higher levels of income.



Open fire burning of coconut husk with shell on metal top and clay bottom of a traditional hornohan.

Coconut husk is the cheapest of the fuels and the smokiest of all. I personally know a torta and a bingka maker who died of cancer.

LINK TO PHOTOS: <https://plus.google.com/photos/113101643783889350444/albums/6054715986028134129>

ATTACHMENTS:

TABLE 1 - COMPARISON OF FUEL AND INSULATION USE IN BINGKA CLAY OVEN

TABLE 2 - PROFITABILITY OF BAKED BINGKA AT AVERAGE YIELD = 112 BINGKAS/5 KG OF RICE

TABLE 3 - ECO-KALAN STAFF & BINGKA TASTERS' PREFERENCES & COMMENTS

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**TABLE 1 - COMPARISON OF FUEL AND INSULATION USE
IN BINGKA CLAY OVEN - M USING 5 Kg OF RICE**

		W* AUGUST 21, 2014	C* AUGUST 8, 2014	C* AUGUST 4, 2014
1	Stove - Ash Insulated	Standard Eco-Kalan	Standard Eco-kalan	Standard Eco-Kalan
2	Oven Insulation	None	None	Aluminum Foil In & Outside the Oven
3	Stove Fuel	Wood (Ipil-Ipil) (Leucaena leucocephala)	Coconut Shell Charcoal (Oling)	Coconut Shell Charcoal (Oling)
4	Sheet Metal Chimney	Yes	Yes	Yes
5	Oven Cover Top Deflector	None	Yes	Yes
6	Time for oven to reach 500°F	25 mins	56 mins	55 mins
7	Time from Start to Finish	4 hrs 25 mins	4 hrs 50 mins	4 hrs 17 mins
8	Total Baking Time	3 hrs 21 mins (Batch Load = 15)	2 hrs 58 mins (Batch Load = 15)	2 hrs 28 mins (Batch Load = 15)
9	Baking Tempertures	Up to 550°F	Up to 510°F *	Up to 600°F *
10	Amount & Cost of Fuel	6 Kg Firewood/₱ 43.84/US \$ 1.02	* 3.8 Kg Charcoal/₱ 87.40/US \$ 2.03	* 2.8 Kg Charcoal/₱ 64.40/ US \$ 1.50
11	Ratio of Bingka Ingredients (kg) to Fuel (kg)	2.35	3.74	5.07

* The low baking temperatures and higher charcoal consumption are likely caused by the higher moisture content in the charcoal at the time. In an August 6, 2014 experiment using uninsulated bingka oven & sun dried charcoal, the oven reached baking temperatures in the 550°F - 600°F range & consumed 3.6 kg of charcoal over 4 hrs & 13 mins.

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Eco-Kalan Project in the Philippines, September 3, 2014

TABLE 2 - PROFITABILITY OF BAKED BINGKA AT AVERAGE YIELD = 112 BINGKAS/5 Kg OF RICE

		W* AUGUST 21, 2014 (Wood Fired) (No Insulation)	C* AUGUST 8, 2014 (Charcoal Fired) (No Insulation)	C* AUGUST 4, 2014 (Charcoal Fired) (With Al Foil Insulation)
1	Prices Bingka Especial ₱ 12.00 each	Price = ₱ 12.00/Bingka (US \$ 0.28)	Price = ₱ 12.00 /Bingka (US \$ 0.28)	Price = ₱ 12.00 /Bingka (US \$ 0.28)
2	Sales Revenue	Sales Potential ₱ 12.00 X 112 = ₱ 1,344.00	Sales Potential ₱ 12.00 x 112 = ₱ 1,344.00	Sales Potential ₱ 12.00 x 112 = ₱ 1,344.00
3	Costs	Ingredients = ₱ 602.00 Firewood (Ipil-Ipil) = ₱ 43.80	Ingredients = ₱ 602.00 Coconut Shell Charcoal = ₱ 87.40	Ingredients = ₱ 602.00 Coconut Shell Charcoal = ₱ 64.40
4	Cost to Insulate oven with Al foil inside & outside = ₱ 160.00 Foil good for 5 X use			Al Foil (1 X use) = ₱ 32.00
5	Total Cost	₱ 645.80	₱ 689.40	₱ 698.40
6	Profit (Compare to Daily Wage of Domestic Helper = ₱100 + 3 meals)	₱ 698.20 (US \$ 16.24)	₱ 654.60 (US \$ 15.22)	₱ 645.60 (US \$ 15.01)

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TABLE 3 - ECO - KALAN STAFF & BINGKA TASTERS' PREFERENCES & COMMENTS

1. Al Foil Insulation - No Al foil insulation. - Costs more than the additional charcoal. - Not available in rural & remote areas. - Extra work with no net economic benefit. - Easier to feel oven temperature without insulation.
2. Thermometer - No thermometer. - Not affordable at ₱ 1,500 (US \$35). - Hand feeling of the oven & visual inspection of the bingka are adequate to gauge temperature.
3. Charcoal from coconut shell - Preferred by city & peri-urban dwellers. - Profit margins at 5 kgs. of rice and above are similar for wood & charcoal fired bingkas. - Burns cleaner than wood; no soot. - Easier to control oven temperature with charcoal than with wood. - Permitted use in public areas such as markets, streets & plazas. - Supply problems due to seasonal availability.
4. Wood (Ipil-Ipil) (<i>Leucaena leucocephala</i>) - Readily available in markets; and freely available in rural & remote areas. - Contamination of baked food with smoke & soot can be minimized or avoided with proper fuel management and use of chimney. - Quality of baking comparable to coconut shell charcoal. - Using wood to fire ovens decreases the pressure to produce charcoal from trees. - Requires more tending of the fire than charcoal. - Wood needs to be cut to small thin pieces. - Wood produces soot & more smoke than charcoal.

5. Bingka Oven

- Versatile - can bake bingka, torta, cakes, cookies, pizzas, lasagna, meats, poultry, fish, casseroles, etc.
- Fired by the fuel efficient eco-kalan clay stove with wood or charcoal.
- Equipped with chimney to remove smoke away from the cook.
- Our first available Bingka Oven was donated on August 16, 2014 to the Sagay Eco-Kalan Kitchen & Feeding Center for its livelihood program in Negros Occidental, Philippines.

6. Baked Bingka

- Best baked in a clay oven.
- Bingka Especial is made with lots of coconut milk & young coconut.
- A highly profitable home business.
- The Philippine Army & NGOs delivering livelihood programs are looking at the eco-kalan fired bingka ovens to help raise women & their families out of poverty.
- The Bingka Oven & Eco-Kalan were demonstrated to Sitio Sampiniton, Manjuyod Lakbay Aral Children, Parents, Teachers, Barangay Officials, Philippine Army, Police & ONCAN members at Felipa Beach, Dumaguete City, Philippines on August 29, 2014.

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Eco-Kalan Project in the Philippines, September 3, 2014