

# Grinders Convert Sorghum into Flour



FIRMC director shows a CTI grinder in use.



Woman offers a drink, atole, made from sorghum



Sorghum grain (left), two grades of sorghum flour (right)

To help contend rising wheat costs Central American bakers are looking for alternative ways to produce their baked products at a low cost without sacrificing nutritional value or taste. Sorghum flour is the answer to their problems. Sorghum flour is about half the cost of wheat flour so using sorghum flour helps bakers save money and make more of a profit. Particle size of sorghum flour must be sufficiently fine in order to substitute for wheat flour in baking recipes. However, small grinders adequate for family level bakers have not been available in Central America. That is until a collaborative project involving the NGO Compatible Technology International (CTI) of Minneapolis, MN, USA, INTSORMIL and CENTA (Centro Nacional de Tecnología Agropecuaria y Forestal) El Salvador introduced the CTI grinders into El Salvador.

The CTI grinders are hand-cranked burr mills, or grinders, which produce flour from various grains. The two grinder models, Omega VI and Ewing were designed specifically for families in developing countries to process crops for consumption in the home and to sell in local markets. Sturdy and easy to use, CTI's grinders are built to withstand challenging environments. Unlike other burr mills on the market, they come equipped with heat treated burrs that withstand wear. Both models can grind various grains such as sorghum.

Since 2007 CTI has been working with INTSORMIL to develop the use of small mills for grinding sorghum. These grinders can be manufactured locally. The grinder body can be constructed of wood, aluminum, or sheet metal; components are easy to reproduce and assemble and are less expensive than the local Nixtamal mills. However, the grinder discs must be imported from CTI as local manufacturer's have not mastered the art of producing high quality, long lasting discs that do not need constant sharpening. The cost of a mill with motor adapted is about \$500 and the one with pedal systems is around \$300 depending on the materials used. The grinder's burr (disc) rarely needs replacement or sharpening. The capacity of these mills is 25 pounds per hour. A 0.5 HP motor (300 to 400 rpm) or bike pedals systems (75 to 100rpm) can be adapted for faster grinding. The grain requires 4 to 6 passes through the grinder and one sieve pass (depending on the sorghum variety used and the purpose of the flour) to get the appropriate particle size (about 200 micrometers) that is needed for food production. Vilma Calderon and Kris Duville, CENTA's Food Technologists have been conducting studies on grinding of sorghum flour



**USAID**  
FROM THE AMERICAN PEOPLE

INTSORMIL is funded by the United States Agency for International Development under  
Leader with Associates Cooperative Agreement EPP-A-00-00016-00

INTSORMIL Management Entity: University of Nebraska,

Phone: (402) 472-6032 Fax: (402) 472-7978 E-mail: SRMLCRSP@UNL.EDU

Web site: <http://intsormil.org>





for food uses and developing sorghum flour-based recipes for baking cakes, cookies, bread and drinks such as atole and have produced a procedure guide for the use of CTI grinders for grinding sorghum flour for specific uses in baking and producing atole, a delicious sorghum-based drink.

The Nixtamal mill (used for grinding wet corn for making tortillas) is locally produced and is available throughout El Salvador and has much more capacity than the CTI grinders. However, it is not suitable for producing fine sorghum flour for baking purposes. Recently as the result of CENTA/CTI collaboration with local El Salvadorian industries a "hybrid mill" made of the Nixtamil mill body adapted with a CTI grinder disc has been developed and is has more capacity for grinding sorghum flour than the CTI Omega VI grinder. (photo La Camgagna).



Filling cup with sorghum based atole

In El Salvador and other Central American countries the substitution of sorghum flour for wheat flour is helping rural bakers increase profits. Although sorghum and wheat prices are constantly changing when imported wheat prices were at US\$ 57 per 100lb sorghum flour was a reasonable alternative at only US\$ 32 per 100lb.

The CTI grinders are being evaluated by bakers such as the MENAPAES (Mesa Nacional de Panificadores de El Salvador) Foundation who are currently using sorghum as a partial and sometimes complete (depending on the product) substitute of expensive imported wheat. The FIRMC (Foundation for International Medical Relief of Children), a rural clinic located in the hilly impoverished coffee region near San Salvador has received a sorghum grinder from the CENTA/INTSORMIL project for evaluation. FIRMC distributes sorghum flour to families with malnourished children and has a medical clinic to evaluate the weight and development of the children on the sorghum-based foods. Children who were fed products made of nutritious sorghum flour made excellent progress and gained from two to five pounds per month. The clinic also allows the public to use the grinder for free and this opportunity has enabled women to make a living selling sorghum products in their community.

With the initial success of the project in mitigating poverty and improving food security and human nutrition the project is expanding throughout El Salvador and into Nicaragua where Ms. Eliette Palacio of INTA (Instituto Nacional de Tecnologia Agricultura) is developing sorghum based flour recipes and training bakers and women entrepreneurial groups on the use of the CTI grinder. This project is expected to expand to other Central American countries in the near future.



Left top:  
Grinder disk  
and sorghum  
flour

Below: Clemencia Barrera  
baking with sorghum flour



Directly above: Food products made from sorghum flour



**For further information regarding this article contact:**

Lloyd Rooney; Regents Professor and Faculty Fellow, Cereal Quality Laboratory; 2474 TAMU College Station, TX 77843-2474 Phone: 979-845-2910 Email: lrooney@tamu.edu, Vilma Ruth Calderon, Cereal Quality Laboratory; 2474 TAMU College Station, TX 77843-2474 Phone: 979-845-2925, Email: vilmaruth02@yahoo.com

**Produced by INTSORMIL Staff:** E.A. Heinrichs [ehenic@vt.edu](mailto:ehenic@vt.edu) and Darcie Samuelson [dsamuelson242@hotmail.com](mailto:dsamuelson242@hotmail.com)