



## ABSTRACT

In Central America, significant progress has been made in the utilization of white sorghums in a wide variety of foods as a partial or complete substitute for more expensive wheat, rice and maize. The new white tan plant color locally grown sorghums are significantly better for processing into light-colored products with bland flavor compared to the native varieties. Workshops by the Salvadorian research institution, CENTA, in partnership with INTSORMIL have disseminated knowledge on sorghum milling technologies and product development of food stuffs to small entrepreneurs and food companies. Sorghum processing is generating significant economic impact in rural communities. Omega VI milling technology has reduced raw material cost for artisan bakers and is alleviating malnutrition among Salvadorian children in the rural communities where whole grain products are consumed.

## INTRODUCTION

Main Objectives of CENTA-INTSORMIL sorghum utilization program in El Salvador:

- Promote production of improved sorghum varieties as value added crops for use in baked goods.
- Stimulate use of sorghum as an alternative cereal for food products during wheat price increase

Sorghum Milling:

- Nixtamal mills are ineffective. Need for more efficient milling equipment is crucial.
- Omega VI produced low cost, good quality flours; transferred and current technology to baking industry through practical workshops.
- Roller and hammer mills can be used for larger production

Product Development of Sorghum Foods:

- Substitution: alone and mixed with other cereal flours.
- CENTA food lab developed many artisan, bakery and traditional products using whole sorghum flour from the Omega VI Mill.

## METHODOLOGY

Sorghum Varieties

- Native and CENTA improved varieties are used.
- CENTA's white tan plant sorghums have optimal appearance, bland flavor and milling properties.
- Small bakers use the Omega VI mill alone or in combination with other milling equipment (i.e. hammer mill) to obtain sorghum flour.
- The fine particles in sorghum flour improves texture. Sifting gives sorghum flour with different particle sizes for various uses.



Hammer mill



Omega VI with sifter



Roller mill

## Workshops

• CENTA has conducted educational workshops on sorghum milling technology since 2008.

• Participants include food industry, farmers, bakers from rural and urban areas, NGO's, and students.

• Workshops disseminate information :



• Grain quality for food production

• Local sorghum varieties

• Milling with Omega VI and other mills.

Product development:  
• Ethnic beverages  
• Snacks  
• Traditional baked goods



## RESULTS AND DISCUSSION

Sorghum Products

• Sorghum Flour use: 15% substitution of wheat in leavened breads, 30% in semitas and cupcakes, 50% in sweet breads and 100% in atole, horchata, tiste and cookies.

• Improved varieties of sorghum are preferred.

• Omega VI mills are more cost-effective for rural businesses and give improved quality products.

• The hammer mill in combination with the low cost Omega VI mill produced high quality flour at higher volumes.



## Workshops and Training

• 590 people were trained on the technology and its use (i.e. associations of bakers – MENAPAES, and ASCOPARSAL, local universities, NGO's (FIMRC nutrition clinic) and women cooperatives).

• Food industry professionals were briefed on sorghum product quality and how to use available technology.

Economic and Social Impact

• Low cost production with the burr (Omega VI) and rural cooperative mills (i.e. nixtamal mills) : -0.12 cents per pound. .

• Large scale production cost: -0.09 cents per pound. .

• Wheat based products using ~30% whole sorghum flour increased profitability by 50%.

• Non-governmental organizations use 100% whole sorghum products, i.e., ethnic beverages – atole & cookies, to combat rural area malnutrition



FIMRC Nutrition Clinic  
Las Delicias, El Salvador

## SUMMARY & CONCLUSIONS

• For larger scale production, the hammer mill in combination with the Omega VI mill generates desirable quality flour at higher volumes.

• Products made with white tan improved sorghum varieties have greater acceptance than the native variety products.

• Sorghum is making significant contributions to improved food and nutritional security in El Salvador.

• Clear economic impact; sorghum is more attractive to bakeries and food industry entrepreneurs even when price of wheat flour decreased.

• Production of wheat based products with 30% substitution of sorghum flour increased profitability by 50%.

• Omega VI mills are economical and practical for rural business. They provide quality products comparable to other mills.

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