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**Report of Nine Sorghum Flour Workshops, Report for INTSORMIL;  
Subject: "Utilization of CTI Grinders for Small Scale Sorghum Flour  
Production in Central America"**

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## **REPORT FOR INTSORMIL**

**SUBJECT:** “Utilization of CTI Grinders for Small Scale Sorghum Flour Production in Central America”

### **I. INTRODUCTION:**

In Nicaragua, Sorghum grain has been a crop used only for animal feed. Fortunately, Scientifics have been researched about its nutritional sorghum grain properties and some of the country that they have been interested to bring the technology about sorghum flour has been Nicaragua because its growths in 3 big areas; in the north, south and west region. Now, that is known their characteristics and others, so INTA and INTSORMIL are diffusing the technology about sorghum flour to increase the production of sorghum grain, reduce the cost production of bread and some ethnic drinks, to improve the food security and finally to increase production and utilization of sorghum grain in this country.

Is very important for countries of Central America region to know all the way that sorghum can be used, for example it can be used for drinks, bread, beer, tortillas, snacks etc. and people has demonstrated acceptance for the products.

There are economical and nutritional opportunities to offer sorghum grain. INTA has to be approach to diffuse technology for all the regions where sorghum growth in Nicaragua moreover, FAO has consider sorghum a group of food that can guaranty the safety food.

### **II. GOAL:**

Promote food security in El Salvador and Nicaragua via the use low of low cost grinders designed by Compatible Technology International (CTI) to mill sorghum into flour use in food products.

### **OBJECTIVES:**

- To demonstrate through workshop development the use and fabrication of small mills to farmers groups, cooperatives, village association, food processor association, etc. for possible reproduction and adoption.
- Training farmers, food industry personnel, bakers, and others interested parties to develop skills and know-how to produce sorghum flour and utilization for food and feed.
- To facilitate the growth of rapidly expanded markets for sorghum products by providing information and different communications medium about nutritional properties, milling equipment and technical assistance.

### **III. Materials and Method**

#### **Materials:**

Grinder Omega VI  
Sorghum flour  
Strong wheat flour  
Soft wheat flour  
Sugar  
Ornamental things  
Semilla de jicaro  
Cacao  
Milk  
Cinnamon  
Starch  
Eggs  
Jelly  
Others

#### **Method:**

We organize the workshop with technicians from different INTA agency. Then we bring all the materials that we will need to do all the bread and drinks. Each workshop is planning for two days and always go two specialist from INTA North Pacific ( INTA Leon). In the morning is explained all theory about sorghum nutritional characteristics, about commercialization, and how to prepare cookies, bread and drinks with sorghum flour. After lunch is prepared the sorghum flour; is explained about cleaning, selection, washing, drying and milling. It is explained and at the same time is doing for participants. Before going home, some of the participants take some amount of sorghum grain to be roasted for preparing drinks like; cacao, horchata and atole. Flour is doing to be used on the next day for bread and drinks. In the morning of the second day is prepared all conditions to make cookies 100% sorghum flour, bread as picos, pan simple, horchata, atole, and tiste. After sorghum is received, some of the participants begin to weigh each ingredient that will be used for horchata or drink, which will be prepared. Some of them begin to mill roasted sorghum. All participants have to be doing something by them to learn how to do it. When the break time comes, it has to be done the drinks that everybody have to taste. After lunch, some participants begin to weigh the ingredients for doing cookies, picos, pan simple, fingers etc. Some of them have to light the oven, because all workshops are doing with artisanal oven. Others begin to mix the ingredients to do bread, cookies etc. INTA specialist is always supervising all the process and is indicating what and how they have to do all. Everybody has to participate and to be attending all recommendations of the process. Every process (drinks, bread) is taking photo to have a file of each workshop.

When the practice finishes, the workshop is evaluating for attendees. Specialists give some questions to be answer for them. The objective of these questions is to know how was the workshop for them, what the specialist have to improve when they are teaching them, if is necessary to make a better food, to provide more materials etc. Evaluation is done to improve the workshop quality.

#### IV. Results and Discussions

a) Since July 2010 has begun to train producers, bakers and some people, who are involved with this kind of activity.

1. First workshop was in June 2010 in this workshop were participated persons 3 INTA's specialists and 22 attendees, 8 men and 14 women. One group from San Jose, El Sauce and other from el Jicaral, both groups from Leon city. Group from el Sauce will receive financial support from FAO to start a baker. This will be in small area. They will acquire some equipment like oven, table, spoons, etc. The cooperative name is "Avanzando en mi Comunidad".

Second group from el Jicaral were trained in the same day, but they will not receive money from FAO, because FAO decided stop funding for add value process. They will finance only systematizations processes. Some groups which were trained with sorghum flour technology (add value process) will not receive funds from FAO. INTA will help them to look for funds.

Jicaral group were attended 5 women and 1 man. Anyway, they are producing sorghum flour and bread and are selling by Jicaral population.



Introduction about sorghum flour



Students from Leon University (UNAN) are Explaining about sorghum mill because They are making their thesis with sorghum flour



Sweet Sorghum bread (20% sorghumflour)



Pudines or Rines 80% sorghum flour



Oven in the community



Simple bread 20% sorghum flour



Semita with black honey 80% sorghum flour



Semita without black honey  
100% sorghum flour



Horchata 100 % sorghum flour



Drinking horchata from sorghum flour



every participant with their certificate



Cookies 100% sorghum



INTA-INTSORMIL Certificate

2. Second workshops were in Nandaime, in which participated 13 persons, 11 women and 2 men. This group is selling maize products as; pinolillo, pinol, cosa de horno etc. They have their own grinders (2 nixtamalization grinders) for selling milling service. They have small are for that.

Now, they add sorghum products as atole, picos, cakes etc. and some others drinks. They liked all the products, but overall atole, because here in Nicaragua, atole can find liquid and solid, but not powder atole and now they can sell instantaneous atole and people can keep around one month. They were in International



Training people from INTA South Pacific



Trained group from Nandaime-INTA South Pacific



Attendees in Nandaime- INTA South Pacific



Women making cookies 100% sorghum flour





Horchata roasted sorghum flour (100%)

Cake 80% sorghum flour



Sorghum atole 100%



Sorghum drink (Horchata 100% sorghum flour)



Making sorghum bread



Milling sorghum grain for drink (Tiste 100% sorghum)



Pan simple and Pico 20% sorghum flour

3. In September the workshop was in Masaya –INTA South Pacific, it is in the south of the country. In this event were participated personas, in which were 6 men and 9 women, 4 technicians and 2 students from University Community Program (PCU).

Teaching method was the same, first day in the morning theory, in the afternoon is showed how sorghum grain has to be cleaned, selected, washed and dried and prepared for milling it.

Then, in the same afternoon participants begin to mill sorghum grain in the Omega VI. Milling is for 6 passes around 5 pounds of sorghum grain. Some of them have to take home sorghum grain to be roasted. This roasted grain is using for drinks as tiste, pinolillo, horchata. For atole they do not need roasted sorghum grain. It can be make it only with sorghum grain without to be roasted. In the second day they begin to make drinks in the mornign and in the break time everybody drink tiste or something else from sorghum. In the middel of the morning every participant begin to prepare bread; picos, pan simple, or pan integral (brand bread) cakes etc.

At the end they evaluate the workshop and all of them receive a certificate form INTA-INTSORMIL.

This group will be benefited by FAO. They have a small quiosco in the road, in where they sale maiz and now sorghum products, this road is a way, which go to different departament in the south of the country.



Workshop in Masaya sorghum cookies 100% sorghum

Sorghum drinks; tiste, atole and horchata



not roasted brand sorghum bread 100% sorghum  
(50% sorghum flour)



Doing some explanations waste paper in which are written  
some formulations of sorghum flour





Roasted brand sorghum breadsimple braed (20% sorghum flour)

Milling sorghum grain and preparing mass to do simple bread



4.AMPROSOR (Sorghum Producers Association) gave some funds to train Chinandega bakers. This event was at the beginning of the last year. Right now 1 pound of cake is cheaper in Chinandega city than y León city. Both cities are in the west of Nicaragua. In this workshop participated 6 men and 7 women. All of them are bakers. Here as in the all workshop is used artisanal oven. Here were trained 7 men and 5 women.

Some bakers from Chinandega City  
Cleaning sorghum grain



Making Cookies 100% sorghum flour



5. The fifth workshop was in El Terrero-Malpaisillo in Leon City. In El Terrero are a group of 11 women 11 and 1 man. They ask INTA to be trained at sorghum flour technology and they bought all materials. Over ther were around 15 persons, 1 man and 14 women. They did picos, simple bread etc. In this workshop were made only some products, because all of them were bought by themselves. Now, they sale products some day during the week for their community.



Participants from el Terrero



Explaining properties and characteristics of sorghum flour



Milling sorghum grain



preparing mass for bread



Making mold for bread



cookies 100% sorghum flour



Artisanal oven



making simple bread 15% sorghum flour

Pico 15% sorghum flour

Roasted cookies 100% sorghum



Cake 80% sorghum flour



Cakes 80% sorghum flour





bakering sorghum bread

6. The last workshop were last december, in which were 25 attendees some of them were INTA's technicians and practitioner from University Community Program (PCU). These students are making practices in INTA. Were 15 men and 9 women. In the workshop was present the owner of the baker, she was learned all about sorghum flour.



Participants meking mass  
For bread



Horchata 100% sorghum



The baker's owner made a  
Cake 80% sorghum flour



Weighing flour and other ingredients



Explaining preparation



Sorghum Tiste 100%





Making bread



everybody is making bread, cookies etc.



Cookies 100% sorghum



Making sorghum bread (15% sorghum)



Bread with jelly



simple bread



Simple bread roasted



behind of bread is the artisanal oven



Roasted cookies 100% sorghum



Bread 15% sorghum



Sorghum bread



rolling simple bread

7. Other of the group had been trained in Nueva Guinea it is South Atlantic Regions (RAAS), in this occasion were women from different groups, individual and cooperative's women. They have done bread from yuca and now they want to implement sorghum technology. In this place were trained 8 men and 17 women.



Theoric seccion



Making cookies



Cookies 100% sorghum

Women cleaning sorghum



Explaining how to do bread





picos 15% and cookies 100% and  
Cakes 80% sorghum flour



Some Resets and explanation

Sorghum drinks Horchata, Tiste and Atol

8. This workshop was in Comalapa-Chontales, INTA Centro Sur, it is located in the Central area of the country, and they cultivate sorghum grain. In this training were participated women from different communities and women from a cooperative. Cooperative's women are implemented the technology. They have been in agriculture ferias and are sealing sorghum bread and some cereals in their community. Here were trained 3 men and 22 women.



Making bread 15% sorghum flour



Cookies 100% sorghum

Cakes 80% sorghum flour



9. Workshop was in the agro industry lab at Agrarian National University (UNA) in Managua. It was for INTA's technicians, because they want to be able transferring technology in each Nicaragua zones. Were trained 10 men and 15 women.



## Making ethnic drinks



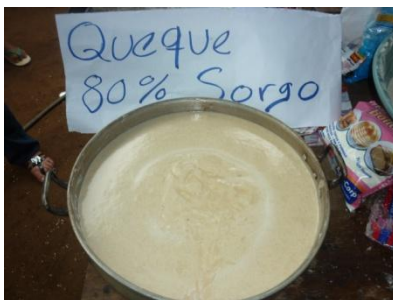
Cookies 100% sorghum flour



10. This workshop was in Somotillo-INTA North Pacific. In this place where women from different cooperatives and individual women. Some of them are implementing the new technology. In this workshop were trained 2 men and 23 women.



Participant are cleaning sorghum grain  
they are mixing ingredients for bread



Doing cookies 100% sorghum flour

Cake 80% sorghum flour

Somotillo group with sorghum flour products



Horchata sorghum flour and Semilla de Jicaro



Tiste with Sorghum flour



Artisanal Oven

Sorghum atole 100% sorghum

Most of participants are making use of the technology, in the south, west and central regions of Nicaragua. To finish this agreement still are a head 3 more groups; which are from Mangua, León and Matagalpa. Some technicians from INTA are asking more workshop for 2012, because they have seen the results when producers use sorghum flour for different products.

Actually, have been trained in INTA North Pacific, INTA South Pacific, INTA South Centro and RAAS. 62 men and 139 women and almost all groups are implemented technology and some of them want to know about other products with sorghum flour.