



**TRAINING OF AFARD (AGENCY FOR ACCELERATED FOR
REGIONAL DEVELOPMENT) FIELD OFFICERS
IN
SOYBEAN PROCESSING AND UTILIZATION AT HOUSEHOLD AND
MICRO ENTERPRISE LEVEL
HELD AT AFFARD HEAD OFFICE, NEBBI DISTRICT
ON THE 12TH AND 13TH OF FEBRUARY 2013**



**CONDUCTED BY MAKERERE SOYBEAN PROGRAM IN PARTNERSHIP WITH
THE NATIONAL SOYBEAN NETWORK (NSOYNET).**

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1.0 BACKGROUND

The Agency for Accelerated Regional Development (AFARD) is one of the lead organisations in the promotion of the soybean production and linking farmers to markets for increased household income and food access. 60% of the people in West Nile still survive on less than 1 USD a day, the majority of the households only afford 1 meal a day, and the diets of the people are mainly based on cassava and cereals which are low in protein and this negatively affects the nutrition status of the people. With the consideration that soybeans do not only increase the incomes of farming households, but can also tremendously improve the nutrition security of the people, AFARD sought it important to include the household utilization of soybeans as an important component her project of Sustainable Agricultural Enhancement.

However, it was important to build the capacity of the field officers first, so that they could kick start the process of empowerment of the communities in encouraging and showing the people simple techniques of how soybeans can tremendously impact the nutrition of the further encourage their farming communities in which they work to include soybean as an important, nutritious food in the diet of people.

This is a report of the utilization training which was conducted at the head-offices of AFFARD, Nebbi. The training was conducted on the 12th and 13th February, 2013 targeted the 12 field officers of AFFARD who work with over 80 farmer groups in the West-Nile region.

The report has been structured to specifically highlight the different activities that were conducted during the two day training and the different recipes developed based on the popular food types and dietary patterns of the people in West Nile.



Figure 1: Some of the foods prepared in the training.

The training started with a presentation from Martin Ssali, the team leader. In the presentation, an overview was made about the composition, importance and benefits of soybeans in human health. The presentation also highlighted the reasons for the limited utilization of soybeans and the different mechanisms/methodologies that can be employed to increase the local consumption of soybeans just like the cereals and the traditional starchy staples. This is also with the consideration that soybeans provide the cheapest complete protein and have great versatility due to its numerous application possibilities and manipulability.

During the session, the trainees (field officers) submitted different popular foods eaten in the West Nile region and the training team had a job of figuring out how soybeans and simple home-made soybean products like toasted soy flour could be incorporated in the daily food people eat. The training was customised to make sure that all the recipes developed and tried out during the two highly intensive days were only those that would be easily adapted and accepted in the diet and culture of the people in West Nile.

Before the trainees would be taken through hands on of aspects of soybean utilization, a short session on production aspects of soybeans was organised. In this session, Mr. Paul Kabayi highlighted some of the factors/wrong practices that were contributing to the low yield of soybean on several farmer fields. He also led the trainees through the establishment of a demonstration garden where he further emphasised the basic skills in setting up a good soya bean garden.



Figure 2: Demonstrating the line planting of soya beans

2.0 The food preparation demonstration activities

2.1 Full fat soy flour

Full fat soy flour is one of the most versatile soy products that can be used in any household. Its applications range from cereal blends for porridges and meals, weaning foods and enhancing the quality of different local sauces that accompany different local staples.

Dry soybean grains contain Trypsin inhibitors that inhibit the absorption and effective utilization of soy protein in the body. The grains **MUST** get wet or dry heated in order to significantly reduce the levels of trypsin inhibitors to less than 20% without affecting the quality of the protein.

In the processing of full fat soya flours, the soybeans must be toasted/roasted first in a pan. The heat enables the reduction of the inhibitors and thus renders the soy protein available to the consumer.

During the demonstrations, the trainees were taken through the process of roasting/toasting. The quality aspects and indicators of roast quality were highlighted during the process.

2.1.1 Process of preparation of full fat soy flour;

- a. Sorting of soybeans to remove stones, dead seeds and any non-soybean material.
- b. Roasting of the beans on medium heat till the beans develop a toast brown colour.
- c. The beans are allowed to cool and then milled to very fine flour.

In case a commercial mill is not available, the cooled beans can be pounded using a motor and pestle to a very flour. This flour may be sieved to obtain a finer flour depending on the application.



Figure 3: Preparation of soya coffee/beverage

2.1.2 Cassava meal preparation with soy flour

Cassava meal is one of main staples in West Nile. A proposal was made to include soy flour in the cassava meal and it worked out. The trainees mentioned that the meal was less sticky, it looked better and also tasted better than plain cassava meal as shown in Figure 4 and 5 below.

Ingredients

- 450 g (3 cups) of cassava flour
- 150 g (1 cup) of soy flour
- 500-700 mls of hot water.

Preparation

The cassava flour was mixed with the soy flour and added to boiling water. The mixture was mingled to form a ready meal which was served to the participants accompanied with a bean/groundnut sauce enhanced with toasted soy flour.



Figure 4: Preparation of cassava meal enhanced with 30% soya flour



Figure 5: Excited trainees get to enjoy their local cassava meal delicacy enhanced with soya flour and served with soya flour sauce.

2.2 Sauce preparations with use of full fat soy flour

2.2.1 Soya sauce based on toasted soy flour

This is a sauce that is based on only toasted soy flour and is a good accompaniment for any local staple like cooked cassava, matooke, potatoes or rice or millet meal. The sauce can also be blended into smoked fish or beef in the preparation of pasted fish or beef.

Ingredients:

- 300g (1 ½ cups) of toasted soya flour
- 1 Tsp cooking oil
- 1 onion
- 1 tomato
- Water
- Salt and curry powder.

Preparation

The onions and tomatoes were fried in oil. Then a paste from the soy flour was prepared and added to the cooked mixture. Curry powder and salt were added for improved taste and flavour.

2.2.2 Green vegetables and toasted soya flour sauce

In West Nile, the most popular vegetables eaten in the households are cow pea leaves locally known as *Ebbo*. These are ordinarily boiled with rock salt and served as a meal accompaniment or a main sauce. In this training, the trainees were shown simple ways of enhancing the quality of this sauce with use of soya flour.

Ingredients:

1. 1 medium size Onion
2. 2 medium size Tomatoes
3. 4 bunches of cow pea leaves
4. 100g (1/2 cup) of toasted soya flour
5. Rock salt to soften the leaves
6. Salt to taste

Preparation

1. The cow pea leaves were cleaned and washed very well
2. The onions and tomatoes were fried and the leaves were added to cook
3. Water was added and the small piece of rock salt and table salt were added.
4. The leaves were boiled for about 10 minutes.
5. A soy flour paste was made and added to the cooked vegetable mixture. The mixture was boiled for about 5 minutes and served.



Figure 6: Trainees sort the cassava and cowpea leaves for the sauce



Figure 7: A blend of green vegetables and soya flour

2.2.3 Beans with soya flour

Beans are very popular in West Nile as an accompanying sauce for several foods. In this demo we showed the officers how they could enhance the nutrient quality and taste of beans with use of toasted soya flour.

Ingredients

1. 200g (1 cup) of beans
2. 100 g (1/2 cup) of toasted soya flour
3. 1 medium onion and 2 tomatoes.
4. Curry powder and salt to taste

Preparation

The beans were cooked for about 3 hours till the point of readiness. The beans were then fried with onions and tomatoes and the soya flour paste was added. Curry powder, salt and water were added to give a good consistency and taste. The mixture was boiled for 10 minutes and served.



Figure 8: Beans sauce enhanced with soya flour

2.2.4 Mukene/Silver fish and soya flour

Silver fish is very popular in the region and it is usually cooked for sauce. In the training a proposal was made to improve the sauce quality by adding toasted soya flour.

Ingredients

1. 200g (2 cups) of silver fish/mukene
2. 50g (1/4 cup) of soya flour
3. 1 big tomato and 1 medium size onion
4. 2-3 table spoons of oil for frying if desired.
5. Salt and curry powder

Preparation

The fish was well cleaned by the participants (Fig___) and actually they removed the heads of the fish because they believe the fish tastes better without the heads. The fish was then then washed to remove all soil and pan fried to develop the fish flavour. The onions and tomatoes were then fried and the fish was added together with some water for soup. The sauce was cooked for about 10 minutes. Then a soybean paste was made which was then added to the mukene soup (the soup is always light). The sauce was cooked again for another 5-10 minute, with added salt and spices for enhanced taste and served.



Figure 9: Cleaning of the silver fish to rid of sand particles



Figure 10: Soybean flour pastes is added to the fried silver fish



Figure 11: Silver fish sauce enhanced with soybean flour

2.3 Porridges with soy flour.

Over 80% of the children in the region mainly consume dry tea for breakfast, 10-15% of children take porridge and only 3-5% of rural households can afford dairy milk every day for their children. This was an opportunity to show the field officers how the different households can enhance the diets of their children.

In this demonstration we chose millet flour as the base to which soy flour could be added. Millet flour is the most popular flour consumed for porridge in the region.

Ingredients

1. 600 g (2 cups) of millet flour
2. 200g (1 cup) of soy flour
3. 1-2 litres of water
4. Sugar to taste

Preparation

The millet and soy flour were mixed together and a paste was made with use of cold water. The mixture was then added to boiling water to form the porridge. Extra water was added to give the porridge a good thick consistency and it was boiled for 10 minutes. Sugar was added to taste and porridge was served.

The porridge was one of the most loved products when it came to the time for tasting.



Figure 12: Millet and soy flour porridge preparation

2.4 Katogo (Mixed food) with soy flour

2.4.1 Matooke-Soya Katogo

- 10 finger of matooke
- 200g (1 cup) of toasted soy flour
- 1 medium onion and 2 medium tomatoes
- Cooking oil and curry powder

Preparation

The matooke was fried in oil with onions and tomatoes. It was cooked upto the point that it was ready. Then a paste of soy flour was made and added to the cooked matooke. The mixture was cooked again for 10 minutes and served.

2.4.2 Cassava-Soya Katogo

- 2 medium size pieces of Cassava
- 200g (1 cup) of toasted soy flour
- 1 medium onion and 2 medium tomatoes
- Cooking oil and curry powder

Preparation

The cassava was peeled and chopped into small pieces. The cassava was cooked upto the point that it was ready. Then a paste of soy flour was made and added to the cooked Cassava. The mixture was cooked again for 10 minutes and served.

Option

Ground Nut paste can be blended with soy flour paste for these katogo meals.



Figure 13: A blend of cassava and soy bean flour paste

3.0 Soy beverage preparation

Today soy beverage has become more common in households just like tea and more than coffee. This was a must demonstration since several households need a quality and low cost beverage every day.

Preparation

The soy beans were roasted up to the point that they turned brown. The browned beans were ground to a fine flour and later sieved to get a uniform powder that can be used in a beverage.



Figure 14; Soy bean beverage ready to be put on hot water

4.0 Sauce preparation from whole soybeans

Several people have tried to prepare soybeans just ordinary beans and this has always back fired. However much they attempt to cook the beans for several hours, the beans just never soften like ordinary beans. As a result, very many people do not know how to prepare whole soybeans.

The trainees were fortunate to be exposed to some of the best research outputs on whole soybean utilization technologies.

Ingredients

- 400g (2 cups) of whole soybeans
- Water
- Sodium bi carbonate (baking soda)/Soda ash
- 10g rock salt
- 2 onions, Oil and 2 large tomatoes
- Curry powder and salt



Preparation

Soybeans were soaked in water which was 4 times the volume of the soybeans. About 10-20g (2-3 table spoons of soda ash) were added to the soak water. The beans were soaked overnight. The following day, the beans were rinsed out of the soak water and added to boiling water in which 10g of rock salt and 10g of bicarbonate of soda was added. The beans were cooked with intensive heat for 3 hours just like ordinary beans. After the 3 hours our beans were palatable and had lost the usual hardness of soybeans.

The beans were then fried with onions and tomatoes. Curry powder and salt were added for the best taste. The beans were further boiled for 10 minutes and served.

All the workshop participants were amazed by the taste of soybeans which was similar to the common peas.

5.0 Soya nuts preparation

This is one of the most common snacks prepared in several households having soybeans or for children returning to boarding schools.

Soya nuts are a cheap source of protein and they are also some of the health snacks that are recommended by health professionals. In this demonstration, the trainees were shown the best techniques of preparing soya nuts with a very good taste and texture. Two techniques were shown; one with the use of oil and the other without oil.

Ingredients

- a. Soybeans
- b. Water
- c. Oil (Optional)
- d. Salt to taste

Preparation

The soybeans were cleaned/sorted (Fig___) and were soaked overnight in water that was 4 times their volume. On the following day, the beans were sundried for 1-2 hours and half were dry toasted in a pan and the others were toasted with a light touch of oil. Salt was added to taste. The soybeans were generally soft with a very good taste. Most of the people preferred the nuts toasted with a touch of oil due to its great colour as shown in the pictures below.



Figure 15: Cleaned and sorted soybeans



Figure 16: Fried soynuts

5.0 Preparation of soy milk

Soy milk provides a low cost alternative to cows' milk yet it provides the same nutrients. Since dairy milk is very expensive in the region, soymilk can provide a good protein source for several households.

Ingredients

- a. 1 Kg (5 cups) soybeans
- b. 20 cups of soak water
- c. 7-8 litres of water for the final grind and cooking of soymilk

Options

- d. Sugar to taste
- e. Coffee or soy beverage if a milk is to be taken as part of breakfast.
- f. 5 mls of vanilla essence for enhanced flavour if desired.

Preparation

1 Kg of soybean grains was sorted, washed and soaked in water the previous night in order to soften the beans, thus easing the extraction of the milk. The following day, the soaked grains were drained of the soak water and rinsed 3 times to rid of any dirt on the beans.

The beans were then dropped into boiling water and boiled for 30 minutes. After the boiling, the seed coat was removed (Fig_) by gently rubbing the grains between the fingers and crushed in a mortar to pulp. The pulp was mixed with cold water (7-8 litres), put in a container thoroughly stirred to get a semi solid mixture that was strained using a clean white cloth to get soya milk as shown in Fig_ below. This was done for about 4-5 times until all the milk is extracted. The soya milk was then boiled, sugar added and served.

The residue from the extract can be dried and used for other purposes like sauces or mixed with common beans.



Figure 17: Removing of hulls from the soybeans



Figure 18: Pounding the soybeans in the traditional way so as to extract the protein for the soymilk



Figure 19: Soy milk in the bottle

6.0 Anyoya pa soya (Mixture of whole beans, whole maize and whole soybeans)

This is one of the most popular dishes in the West Nile region. Traditionally, it is a blend of whole maize, beans blended with fried onions and oil. In order to enhance the protein quality of this dish and also to increase soybean utilization a suggestion was made to add whole soybeans to this special dish.

Ingredients:

- 200g (1 cup) whole maize
- 200g (1 cup) of beans
- 200g (1 cup) of soybeans.
- 20 mls (5-6 tablespoons of vegetable oil)
- 2 medium size onions
- Water
- 50 g of baking powder/soda ash

Preparation

The soybeans were first soaked overnight in water in which baking soda/soda ash was added. The soybeans were then cooked with cleaned whole maize and beans overnight. (Traditionally, this is the way it is done so as to get the maize as tender as possible). On the following day, the mixture was drained of all the remaining liquid. Then the onions were fried in oil till brown and they were then added to the drained beans, maize and soybeans. Salt was added to give the blend an enhanced taste.



Figure 20: A blend of whole Maize, beans and soybeans

7.0 Micro-enterprise soybean based projects/businesses

7.1 Doughnuts

These are some of the common snacks that people eat in the regions. In this demo, the trainers showed the officers how a doughnut enhanced with soya flour can be made.

Ingredients

- 600 g (3 cups) of wheat flour
- 200g (1 cup) of soya flour
- ¼ cup sugar
- 1 ½ tbsp. baking powder
- 2 eggs
- 2 tbspn vanilla essence
- 1 cup soymilk (Optional)
- Water
- Oil

Preparation

The wheat and soyflour were mixed together. Baking powder was sifted, then sugar, vanilla and eggs were added and finally water was added. The mix was kneaded to a non-stick dough. The dough was laid out and different round shapes were cut out which were then fried.



Figure 21: doughnuts enhanced with 30% soya flour

7.2 Baghia

This is a common snack that is loved by children and adults and it is an easy product that can be transformed into a micro scale business. The traditional recipes of baghia mainly compose of cassava and due to its high starch content, the baghia is usually hard. A proposal was then made to improve the textural and nutrition quality of baghia by adding toasted soya flour.

Ingredients

- 600 g (3 cups) cassava flour
- 200g (1 cup) soya flour
- 3 table spoons wheat flour
- 2 table spoon cooking oil
- 1 table spoon baking powder
- Water to make a stiff dough
- Oil for deep frying

Preparation

The cassava flour was blended with soybean flour. Then baking powder, wheat flour and 2 table spoons of oil were mixed in. Water was added to make a fairly stiff dough. The dough was then placed into a baghia press and pressed out in the different shapes of baghia into hot oil. The baghia was fried for a couple of minutes till golden brown. It was allowed to cool, a process which also allows the baghia to evaporate the excess water and thus becoming crunchier.



Figure 22: Baghia with 50% soya flour and 50% cassava flour

7.3 Half cakes and daddies (small mandazi)

Ingredients

- 600g (3 cups) wheat flour
- 200g (1 cup) soya flour
- 50 ml (1/2 tea cup) of oil
- 3 table spoons of baking powder
- 50 g (1/4 cup) of sugar
- Water for mixing

Preparation

The wheat flour was blended with the soya flour. The baking powder was then added. Afterwards, sugar and oil were added and mixed in very well. Finally water was added and the dough was kneaded up the point that it was not stick and could be spread out easily for cutting into the half cake shapes and the small mandazi's and there after fried to golden brown colour as shown in Figure__.



Figure 23: Mandazi with 30% soya flour

8.0 Recommendations as follow up actions after the trainings

Based on the training, AFFARD can chose to select specific enterprises that can be adopted as income generating projects for the organisation. Some of these can include;

1. Soymilk processing in the urban areas.

Soymilk can be produced profitably at half the price of dairy milk. We have attached profiles of companies and Soy cows and Vita goat systems for perusal.

2. Processing of cereal blends with soya flour

This can include preparation of millet and soya flour blends or investing in extruding systems for maize and soya flour blends.

3. Processing of cassava flour and soy flour blends.

This helps to make a better and enhanced cassava meal.

4. Processing of soya beans into soya beverages

This is a low cost way of providing a healthy beverage to the communities