AN EXAMPLE OF SOLAR FOOD PROCESSING: COOPERATIVE PRODUCTION OF AGAVE SIRUP (MIEL DE MAGUEY) IN MEXICO

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ABSTRACT

A woman-cooperative in the State of Hidalgo is going to install the first commercially used set of Scheffler Reflectors in Mexico. In the village of San Andrés Daboxtha in the Mezquital Valley the cooperative is producing Miel de Maguey, agave syrup.

For the women it will be of great benefit to become independent from the ever rising gas prices.

The cooperative is the first productive unit in Mexico that uses solar reflectors for food processing. It is a pioneering enterprise. Therefore it has great significance for the future of solar food processing in Mexico. For the manufacturer it will serve as a reference installation.

Keywords: Solar Food Processing, Mexico, Scheffler Reflector, cooperative production, evaporation, interest free loan

1. INTRODUCTION and BACKGROUND

The women founded their cooperative "Grupo Milpa de Maguey Tierno de la Mujer" in 1989 because it made it possible for them to receive a loan for starting a small sheep breeding project. They belong to the indigenous group of the Ñähñu, who speak their own language, Hñähñu. In 1995 they began with the cooperative production of agave syrup and presently 47 women are involved. The Maguey is a plant that had a lot of significance for the Ñähñu throughout their history: it was used as fibres (Ixtle) for clothes, covers and rope, as building material (roof and wall tiles), to protect land from erosion, as sweetener (Miel de Maguey, the syrup), as nutritious beverage (Aguamiel), as alcoholic beverage (Pulque) and as a vegetable (the flower).

Picture 1: the Maguey

Nowadays modern materials have replaced the different functions of this plant. Only the juice of the Maguey is still being processed. But the extremely low price doesn't allow women any profit.
The Maguey has to be cultivated for 6 to 9 years before it can be harvested.

Picture 2: harvesting the juice

For that the heart of the plant is cut out. The juice of the plant is then bleeding into the newly formed hollow. It has to be collected twice a day. Over several days up to 70 l of the sweet liquid can be harvested from one plant.

Processing the juice of the plant into syrup allows a small profit margin. The cooperative decided to do this together.

They organized another loan and invested into a small kitchen building, large stainless steel pots, gas burners, etc.

Their product is sold in bottles of 250ml and 500ml directly by them. Their own consumption of the syrup contributes to a better nutrition of their families. It contains minerals and vitamins and is supposed to have preventive properties for different illnesses (diabetes, osteoporosis, respiratory ailments).

Changing their production from fossil fuel to solar will help the cooperative to survive.

Because of lack of water the only agriculture possible in this semi desertic region seems to be the ecologically adapted style of farming that has been practised here over centuries. The Maguey is a plant perfectly adapted to the climate. It has been an integral part of local agriculture. Traditionally it is planted in rows between the fields. It provides a natural barrier for wind and water erosion and retains the soil. On the fields the staple food in this region, beans and corn, is grown. Because of lacking rainfall harvests take place only every third year. Growing less agaves has a negative impact on other crops.

Picture 3: rows of Maguey between maize fields

It has become more and more difficult for people to sell their traditional products. This results in a lack of perspectives and drives many men and women into illegal migration (to the US).

The cooperative has replanted already 20,000 agaves.

Once the juice of the Maguey is collected it is relatively simple to process. In large stainless steel pots it is boiled until the volume has reduced to about 1/10. The water evaporates and therefore the juice gets thicker and darker in colour. Towards the end of the process it has to be stirred to prevent the liquid from getting burnt.

Picture 4: at the beginning of boiling (solar test)

Picture 5: after some hours (solar test)

Picture 6: at the end of the process the syrup needs to be stirred, women at work with the gas burners

2. THIS PROJECT

The Valle del Mezquital has a dry and very sunny climate. The village of San Andrès is located over 1000m above sea level. These are ideal conditions for the use of solar energy.

Picture 7: a flowering agave at the edge of the Valle del Mezquital

The idea of using Scheffler Reflectors came from Mr. Gregor Schäpers. He has been in contact with the cooperative for several years. Since 1999 he was involved in the manufacturing of SK14 in the nearby Centro Social de Cardonal. In 1999 he and the women from the cooperative tested whether the SK14 could be used for processing agave juice.

Picture 8: testing the SK14

The women were not content with the result of the test. One reason was that the SK14 didn't allow them to work inside their kitchen where the product is protected from dust and flies (see picture 6). The other reason was that the processing capacity of the SK14 was to low for their purpose. One Sk14 will allow to turn between 6 and 7 l of agave juice into syrup. The women need to process at least 100 l of juice per day.
Mr Schäpers was looking for a reflector that allows indoor cooking and has more power. Searching the internet he found the Scheffler Reflectors. In 2004 he started by constructing one reflector of 8m². It is used as a mobile demonstration unit and was set up in the village San Andres during autumn 2005.

The women tested the system and in beginning of 2006 they decided to equip their kitchen with Scheffler Reflectors.

Picture 9: testing the 8m² Scheffler Reflector

Instead of using gas fired burners for the production of the syrup the kitchen of the cooperative will now be equipped with six Scheffler Reflectors of 10m² each. Every reflector concentrates light onto a secondary reflector (inside the building) which helps to distribute the energy evenly around the bottom of the cooking vessel. The hole set- up is designed to process up to 200 l of juice per day.

Fuel costs will be saved. This can lead either to a lower sales price of the product or to higher profit for the women (with same or higher sales price). One idea is to market the syrup specifically as a "solar product". This might open a new market niche.

It is necessary to build an extension to the kitchen building to be able to accommodate the reflectors, the existing building is too short.

The reflectors will be manufactured and installed by an other cooperative, which has been recently formed by Mr

Schäepers. They produce solar hot water systems and Scheffler Reflectors for the local market.

In 2005 the Swiss association *Globosol* offered an interest free loan to the women's cooperative in order to support their pioneering spirit. The conditions under which the loan should be paid back and the total sum was to be decided by the women. Beginning of 2006 they handed in a request for around 15 000,- € . They want to pay the loan back by depositing 2/3 of their annual gas savings. In 2005 spending on gas summed up to about 2300,-€. This would lead to a very long payback period of over 10 years. Efforts are made to increase (solar) production.

Globosol intends to turn the money paid back into a revolving fund to help more solar related projects in the region.

3. CONCLUSION

It is too early for a conclusion because, the solar production is not running yet.

Currently (beginning of May 06) manufacturing of the reflectors has started and the plans for extending the kitchen building are passed.

What can be said as an early conclusion: the part of the project that had to do with decision making and organising the funds was difficult. Despite the fact that all involved parties were willing to contribute to the project and to do their best, it took a very long time to come to terms and finally formulate a contract between the women's cooperative and the facilitator of the loan. More the one year passed between Globosol deciding to support the cooperative and the start of manufacturing. The women in Mexico thought through their decision for a solar conversion of their workshop very thoroughly and waited until all members were convinced of the plan.

If it hadn't been for the ceaseless efforts of Mr Schaepers the project would not have passed this stage. Several times manufacturing of the reflectors had to be postponed because the contract was not signed yet. For the cooperative manufacturing the reflectors this has been a difficult phase. Globosol for its part has insisted on regulating every point precisely. Special attention was give to maintenance of the installation and follow up with the ladies. Some earlier solar cooking projects did not guarantee maintenance and follow up in a well thought up way. This has lead to a focus on exactly that aspect.

For more information on this particular project or on Scheffler Reflectors in Mexico you can contact Mr Schäpers: gregorschaepers@gmx.net
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