

USE OF THE SCHEFFLER SOLAR OVEN FOR THE MAKING OF BREAD WITH KIWICHA (AMARANTHUS C.) AND QUINUA (QUENOPODIUM Q. W.) IN THE NORTH OF ARGENTINA

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ABSTRACT

The making of common bread, energized with flour of Kiwicha (*Amaranthus C.*) and Quinoa (*Quenopodium Q.*) in a Scheffler Solar Bakery is a help for the Andean population and in other latitudes, to improve the alimentary diet, the preservation of the environment and the control of the costs using the sun as the energetic source.

The work includes seeding, management and harvest of both grains, Amaranth and Quinoa, which are exceptional in their quality of proteins. It includes the provision of the seeds (not hybrid) and with them the control of the cultivation, assuring to close the complete and highly efficient production circle: Seeding, harvest, milling to flour, fabrication of the Scheffler Solar Bakery and the making of the bread.

The realized experience was an excellent synthesis between researchers, specialized in the use of solar energy, and inhabitants of the Andean regions of the Province of Jujuy in the north of Argentina, who summarized their ancestral farmer wisdom in the management of cultivation since the times of the Mayas and Incas.

Proposing a real base for developments of little family enterprises or cooperatives, that want to industrialize flour and make products of high quality at prices which are affordable for the majority of the population in the Third World.

Keywords: Flour of Kiwicha, Amaranth and Quinoa, Scheffler Solar Bakery.

1. INTRODUCTION AND BACKGROUND

By the end of the 1980's in the Quebrada and Puna(1) of the Province of Jujuy, in the north of Argentina, a paradigm came to an end, which was fading during a long time: the metallic mining. With this single exception, the jumping into industrialization was left in the remains of the provincial history and never came out. But the consequences of decades of destruction of the environment can now be seen. The small Queñoa(2) woods disappeared and only the Tola(3) remained, a resinous bush with a high calorific potential, but its extinction was soon on the way. These plants are the only fuel available in about 30.000 km², in a region inhabited by the Kollas(4) and the Atakameños, native peoples who inherited the desert. Following the decline of the Andean society, there followed the devastation of the main natural resources: trees and plants were destroyed, the land was contaminated, etc. With this background of helplessness, the Project for the Integration and Rescue of the Andine Culture (PIRCA) was started with a medium and long-term period. We spent some time collecting information to answer the first question: "What do we have to do?" It was obvious that on one hand we had to work on non-conventional energy sources and on the other hand we had to recover ancient crops that in older times had been the basic food for native peoples. We started fabricating the Ulog oven(5). The results, referring to the capacity for cooking of food, was widely satisfactory. Being in a region with high solar radiation, the Quebrada and Puna, this kind of device would work efficiently. It was obvious that we were on the correct way. On the other hand, in Germany researchers were experimenting with the Parabolic Cooker called SK 14. The new cooker showed to be efficient and the technological transference to the Third World started.

This occurred and soon we had a better technology to serve the rural communities. The adoption of the new system was much easier when German instructors came to our country to train us in the making of the cookers. We could set up a small factory and, step by step, we stored experience, and we were even able to modify the original design to make them suitable for a region with an altitude range of 2,500 to 4,000 meters above sea level and adapted to the Andean Culture(8). At the same time, we began to use high quality Amaranth(9) and Quinoa(10) seeds, thanks to the work realized in the universities of Mexico, Peru and Bolivia. This provided a well known resource but in a better quality to start again the sowing of corns with extraordinary protein value.

2. CONSOLIDATION OF THE PROJECT

Since long ago, any project is a hazardous undertaking in Argentina. Projection into the future is difficult because we never know when the next crisis will come. This is revealed by the short-period undertakings that came to be normal in our country. But, the diversity of the Andean culture (6), which has "different times," allowed us to carry on investigative and practical tasks in a non-occidental rhythm and enabled us to work quietly. Time went on and people adopted different habits in organization, feeding, etc. Then we had to face a dangerous dilemma: the "old" or "ancestral" opposition to the "new" or "modern" ways of living. At the same time, the media (radio, T.V., newspapers) insisted that the past is gone and dead. But people from the native nations came and it is as if they said: "The past is alive" and there is no conflict between the past and the present, and we can use new technology without resigning from our position in a world that still exists. Anyway, every discourse has an aspect of "intellectualism" that may be the cause for the rejection in the world of the small farmers, the place of our work. That is to say, they dislike others' rejection of their efforts to maintain and reconstruct a cultural world already partly destroyed.) That is why our main task will be practical. We have to "do", to produce the transformation by doing. The best speech and example for a Punaño countryman is to see that other farmers make their own cookers, cook their meals in them and make sustainable use of the natural resources. Where words end, recognition starts. It is a long task, however, because we lack state policies related to this subject. Consequently, the effort is aimed at the selection of tasks, elaboration, applications, corrections of mistakes, adaptation, etc.

The fact of maintaining a technical team implies the continuity of the project, the production and transference to the field. One hundred cookers in the Puna in ten years

may seem to be too few, however, there are two circumstances to be considered:

The first is related to the change that will occur when we run out of fossil fuel, but the solar source of energy is already at hand and will disappear only by the end of Time, which scientists say will happen in 3,000,000,000 years. This gives us a small handicap. Also the price of oil and its derivatives give a hint of the world of the future. Another aspect of the problem is that contamination of our planet caused by the oil industry will be increasing the same as environmental problems. We are conscious of this every day. Each country, each region will have to stand in defense of its environment or will disappear. This is new. This is what we are doing now, spreading the knowledge about the solar option.

The second circumstance is related to "human fuel". Countries that left behind starvation can choose their food. At least a lot of them have that possibility. Let's leave aside those poor people that eat fatty food because it has been imposed and widely advertised by the market. There are more and more people that could possess the best "human fuel" if they educate their preferences about food. Among human fuels there are three kinds of corn that will be of fundamental importance in the Third Millennium: Quenopodium Quinoa Wild (Kinua)(7), Amaranthus Caudatus (Kiwicha)(8) and Salvia Hispánica (Chia). Of course there are others, but we work with these. It is in this field, also in the nutritional technology, where we have a strong tradition and the germoplasmatic resources to accept the challenge of further development. This is not the decision or purpose of a particular country, it has its foundation in the depths of a culture. In this case, it is the Andean culture, but there are others that are also helping to heal our human condition. That is why there exists the relationship between solar energy and Andean food, which belongs to a universal solar culture.

2.1 Considerations about the making of bread with Kiwicha and/or Kinua flour

This work refers to Argentina, because it is the country where we live, but does not exclude the extrapolation to other regions or countries where similar conditions would be possible. The making of bread with Kiwicha needs to be complemented with wheat flour. In Argentina wheat flour is abundant and cheap. Besides, there is a strong "bread culture" in almost every home. It is one of the reasons why we lead this feeding reinforcement through bread. This required research about the proportions of the Kiwicha-wheat flour and also about the preparation of a kind of bread similar to the standard one in taste, colour and smell. Finally, we achieved our aim. There is a close relationship between it and the way grains are crushed. We put to work old stone mills that work in the region but were not used except to crush maize to make

“Chicha”(9) for the festivals. So, we had a high-quality flour and only the technology of the baking of the bread was left to consideration.

The Scheffler Reflector - which irradiates a temperature of 900°C – could be used with the addition of an oven. Again we received technical and professional support from Germany, to get a temperature into the oven of 300°C, so that the bread could have the consistency and golden color of ordinary bread. Color is so important because most people don't like white bread because it looks not-fully cooked, even if it may be so. Though all the problems about bread had been solved, we needed to get a suitable temperature for the oven to cook “asados”(10), mainly of lamb, which is the usual meat in the region. We tried to give options for use by the small farmer communities and not to set apart technology from their feeding habits. On the contrary, the aim is to make it possible to cook at a lower energy cost.

2.2 Technological package

The global conclusion of this project allowed us to prepare what could be called a “Technological Package”. We propose that it be transferred to groups, organizations and small enterprises that might have as their main aims the improving of living conditions and preservation of environment through the diffusion of and use of technological alternatives, like in this case the solar energy. For the first time we could avoid the dependence on an unsuitable state that, linked to absurd interests and policies, does not meet its responsibilities. This was possible thanks to national and foreign institutions, to technicians, professionals and other people whose most important goal is to stand for Nature. This enables us to demonstrate ourselves and to the communities round us that there are tasks, as small they may be, and that we can carry on thinking that many other people in many sites of our planet are doing the same. Some day all our efforts will sum up and the homeopathic doses will show their good effects.

2.3 About mistakes

It was not until the third millenium that Argentina recognized herself as a multicultural and pluri-technical country. This change gave birth to diversity and the cultural wealth that it implies. The fact that “education”supplied up to the last century for native people – who were not considered citizens - was uniform, totalitarian and paradoxically made possible the exclusion of native peoples from the official system. They had been educated to be a “colony,” not to be free. Until a few years ago the educational system severely penalized mistakes and did not allow diversity, as though an Irishman were punished for thinking like an Irishman

and not like Englishman. In that context technology was not frequently transferred, but was used on the colonizer’s side as another means of getting and showing power. This model, which is now gradually being disregarded had been first used by the European countries.

3. CONCLUSION AND FINAL SYNTHESIS

When we say that at present we can be hopeful, it is because now we are aware of the fact that any technological change must be introduced respecting the diversity of cultures in our country. We must be a means to “filter” technology to be sure it will help us and not lead us to destruction. In this context solar culture belongs to every culture that faces for the first time, in the history of humanity, the destruction of their environment due to human insensitivity.

GLOSSARY

1. Quebrada y Puna: Geographic area in the Northwest of Argentina.
- 2- Queñoa: (*Polilepsis Tomentella*) – A tree that grows at 3,500mts. above sea level in the Puna Jujena, in process of extinction.
- 3 Tola: (*Baccharis Boliviansis*) –A bush that grows in the Puna and is used for fuel.
- 4 Kollas: People from the North of Argentina and the South of Bolivia that in former times belonged to the Kollasuyo (zona del Sur).
- 5 Ulog oven: A device made in Switzerland.
- 6 Andine Culture: All the cultures of the zone of the Andes chain in the South of America.
- 7 Quinoa: (*Quenapodium Quinoa W.*) – Pseudo andine cereal. It was the feeding basis in the Inca culture.
- 8 Amaranto (*Amarantus Caudatus*) – Pseudo-cereal grown in Central America that is sowed in the South with the Quechua name of Kiwicha.
- 9 Chicha: A drink used in cermonies. It is made of maize.
- 10 Asado: Lamb or cow meat cooked or fireprepared with wood or coal.