FUNDACION SOLAR – CALTECH

FINAL REPORT

2008 GUATEMALA TRIP AND PROTOTYPE ACTIVITIES

ELABORATED BY:
ARTURO UJPÁN MENDOZA

DECEMBER 2008
CONTENTS:

- Backround Fundación solar-Caltech..................................................4
- Progress reports per prototype and activity.....................................6

- Prototype 1: Improved Stove...............................................................6
  - Table no. 1, control of use and quantities
    of fuel from the stove.................................................................10
  - Table no. 2, stove comparison.........................................................10
  - Conclusions of the stove...............................................................11
  - Recommendations and comments of the stove..............................12

- Prototype 2: corn sheller.................................................................13
  - Conclusions.................................................................................16
  - Recommendations........................................................................17
  - Comments....................................................................................17

- Prototype 3: Compost Latrine...........................................................18
  - Table 3, approximate quantities collected from the
    latrine..........................................................................................20
  - Conclusions...................................................................................21
  - Technical recommendations and comments.................................21

- Prototype 4: Drip Irrigation Systems.................................................22
  - Conclusions and advantages of drip
    Irrigation systems......................................................................25
  - Recommendations.........................................................................25

- Prototype 5: Pedal Power .................................................................26
  - Conclusions...................................................................................27
  - Recommendations.........................................................................27
- Prototype 6: Wheelchair ................................................................. 27
  - Recommendations ........................................................................ 28

- Export business activity, Profile information for honey production project ............................................................... 29
  - Population of San Juan la Laguna .............................................. 30
  - Political-administrative division .................................................. 30
  - Agricultural production............................................................... 32
  - Animal husbandry ...................................................................... 32

- Final recommendations and reflections about the program ......................................................................................... 32

- Annexes
  - Annex 1: mapa geográfico del municipio
    De San Juan la Laguna, Sololá .................................................. 35
  - Annex 2: export business survey .................................................. 36
  - Annex 3: tools that the honey bee group will be using to modify the centrifuge ......................................................... 48
  - Annex 4: List and important data of the Beekeepers ................................. 49
  - Annex 5: stove survey ................................................................. 52
  - Annex 6: food drier survey ......................................................... 55
  - Annex 7: field coordinator for Caltech E/me105, mid term evaluation .............................................................. 57
  - Annex 8: activities of monthly report
    Delivered to the Fundación solar .................................................. 62
The Fundación Solar has aimed at finding positive solutions for a growing number of community organizations, private sector associations, NGOs, local governments, agencies, technical and financial cooperation, national and international, with whom they coordinate projects concerning the environment and the management of renewable natural resources.

Since its inception, the Fundación Solar has worked to accompany various processes of rural development through programs and projects related to the stimulation of the local economy and local capacity building. The organization establishes institutional alliances to provide expert management for the use of renewable natural resources as a contribution to reducing poverty and to protect the environmental and cultural heritage.

In January 2007, the Fundacion Solar established a working relationship with the California Institute of Technology (CALTECH) to promote appropriate technology development in the Lake Atitlán area and to support the undergraduate course: “E105: Product Design for the Developing World”, taught by professor of mechanical engineering, Ken Pickar. The course gives students firsthand experience designing and developing products for production and sale in developing countries. Professor Pickar requires students to gather market research and engineering specifications for products for sustainable development and income generation opportunities for end-consumers in developing nations.
In August 2007, a group of CALTECH students and professors visited San Juan LL for two days as part of a larger itinerary encompassing various small communities in Guatemala. As this was the first organized visit, the short time in San Juan LL did not give the students enough time to comprehend the local situation and the impact their products could have. Thus, after much analysis and discussion, CALTECH and the Fundación Solar, with the help of a new actor, Caltech Y, a Los Angeles-based non-profit, redesigned the technical trip to Guatemala to allow more time in only one community where several prototypes would be developed and tested and a construction and installation project could be done during the time in-country.

In July 2008, CALTECH students and professors, representatives of Caltech Y, the Fundación Solar, industrial design students and professors from Rafael Landívar University, and San Juan La Laguna community members came together to work with individuals and families with an income of approximately $2 per day living the village of Pasajquíum, in the municipality of San Juan La Laguna.

Caltech Y co-sponsored the 2008 trip. This time, 14 Caltech students, seven Rafael Landívar University students from Guatemala City, and six students from San Juan La Laguna worked with local people for the development of six prototypes. In total, the groups worked in Pasajquíum for eight days from July 1 to July 8. The prototypes: 1) Corn sheller; 2) Improved Stove; 3) Compost Latrine; 4) Drip Irrigation System; 5) Pedal Power; and 6) Wheel Chair are described in this report. In addition, the students and local participants worked on the activity, “Honey as a potential product for export”.

These projects were implemented thanks to the collaboration of this community who were involved in the creation of different
prototypes. This report covers the period from July 9 through November 30, 2008 and includes all of the follow-up activities with each of the six prototypes and the local work groups.

PROGRESS REPORTS

PER PROTOTYPE AND ACTIVITY

PROTOTYPE 1: IMPROVED STOVE

Name and phone of partner/participant:
Paulina Baran    (502) 5321-0464

For people who live in rural communities, firewood (leña) is a natural resource needed to survive. Firewood is used to prepare food every day and many people spend a large part of the day collecting it.

Often people must go far from their home to get firewood. In addition, they must cut it, carry it back to their homes, dry it, and prepare it to be useful in the kitchen. Firewood is not just a renewable resource or survival tool it is also an essential part of a comprehensive housing system that provides light, heat, and protection from insects. The way in which we use firewood affects our co-existence, comfort, food preparation, and the economy of our kitchens. To understand the problem of firewood in a region, it is necessary to understand the local customs regarding food preparation and the complexity of the use of domestic resources.
There is continued felling of trees for firewood. It is faster than the growth of forests and this has had a negative impact on the environment. One of the largest consumers of firewood in Central America is Guatemala. Any efforts to conserve forests or to make the use of firewood more efficient can have positive impacts for families all over the country.

Many families in Pasajquím want the improved stove because it is a basic tool in the kitchen. In the home, especially during the winter months of November through February, the stove serves a dual purpose, both cooking and heating. The improved stoves are particularly helpful because they keep the heat after being used.

In July 2008, Carlos Marroquin from Maya Pedal and students from Caltech-Landivar and San Juan La Laguna build the improved stove prototype in the home of Doña Paulina Baran. The main idea was to use the metal plate (of the improved stove) and also able to use a space inside the stove to cook in the coals like an oven. The construction of basic refractory bricks, it has the access of combustion front door with a metal welded to the structure of the stove and a chimney located at the corner of the stove.

By August, Mrs. Baran had used the stove six times and in total, she had used four logs for a total of five hours of cooking: corn, coffee, beans and warming remains of food. During this time, the Baran family identified two problems with the stove both had to do with escaping smoke. The first problem was the smoke escaping from the front door. The second was smoke escaped from the base of the chimney. At that time, the Baran family and I discussed the idea that it may be better to move the chimney from the corner of the stovetop to the center for improved exhaust but the family chose to wait for Carlos Marroquin to return from the United States to make the repairs. Despite the escaping smoke problem, we discovered the
improved stove was indeed more efficient than the old stove.
Previously, Mrs. Baran had used between 8-10 logs for the same
amount of cooking time. Now, with the new stove, she was only
using four logs.

By September, Mrs. Baran and I could not wait more time for Carlos
Marroquin to come back from the States so we contacted Julio Cesar
from Tecnología Para la Salud (TPS) to ask him for support.
Unfortunately, this was not possible because this option was too
expensive. Then, we had to find a local solution. To fix the stove, Mrs.
Baran and I discussed the fact she needed to use the stove every day
and could not afford to wait too much longer for solutions. We
concluded the best option was to contact the local bricklayer,
Cristobal Chavez, from Panyebar, to fix these initial smoke problems.
Also, during this month, we continued to register the daily use of
firewood. By this time she was using 12-15 logs all day which was
still a savings for her.

By October, Mrs. Baran had used the improved stove for two full
months. Initially she had been using four logs for five hours of
cooking. By this time, she was using 10-12 logs to keep the stove
going all day. The bricklayer, Mr. Chavez, and I tried to fix the front
door since there was still a lot of smoke leakage from there. Initially,
Mr. Chavez added cement to the door frame to close the gap
between the door and the stove. This did not work well and the
cement came off. Then, we tried to straighten the door to improve
the fit in the frame. This helped a little but the problem remains.
Also, while trying to fix these problems, we identified another one:
the chimney tube needed a hat to stop the rain from entering. Not
only was the water damaging the inside of the plate (hornillas), but
it mixed with the smoke and was staining the kitchen. After
discovering all of these problems, Mrs. Baran, Mr. Chavez and I, met
to discuss options. We agreed to buy a hat for the chimney as a
short-term solution to the water problem. We purchased all of the materials for fixing the stove (the cement, metal, chimney hat, etc.) from Adrian at Agroferriluz Santa Clara.

By November, Mrs. Baran had been using the stove for three months. The initial smoke leakage problems still exist and Mr. Chavez and I have been trying to fix them while Mrs. Baran continues to use the stove. With the door, we sought ways to resolve the problem by straightening the door, by adhering pieces of metal on the door and by adding cement in the parts where the smoke leaks. We concluded the main problem of the smoke leakage was the front door and not the chimney. So, we thought to change the door of the stove completely, also to modify the frame of the door with cement, and pieces of metal. In the end, we did not change the door we just bent it up at the edge. Also, since in the first attempt, we did not use enough cement and surface fell off, Mr. Chavez redid the surface. Also, this time, Mr. Chavez recommended that Mrs. Baran stop using the stove for at least one week. She did this and started using the stove again on November 16.

As of November 30, Mrs. Baran is using the stove without having to inhale the smoke. The repairs appear to be working. For the most part, despite these problems, the family has found the stove to be efficient. The family is still excited about the stove and they are using it every day, saving both time and money on firewood. Mrs. Baran is happy because I always check in with her and seek ways to refine the stove. Also, every time we make adjustments to the stove, many people come to see them because there is still great interest from other families to own one like hers.
Table No. 1 "Control of use and quantities of fuel from the stove"

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Stove of Caltech, FS, Maya Pedal</th>
<th>Traditional Stove</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of hours used</td>
<td>one day = 10 hours</td>
<td>one day = 10 hours</td>
<td>To cook food three times more tortillas for four people and two snacks (refaccion)</td>
</tr>
<tr>
<td>Number of firewood (leña) used</td>
<td>8 to 10 pieces of firewood (leña)</td>
<td>15 pieces of firewood</td>
<td>The stove with oven dry firewood green</td>
</tr>
<tr>
<td>Quantity of Food Prepared</td>
<td>Three times of food for four people</td>
<td>Three times meal for four people</td>
<td>Plus two snacks (refacciones) to spare parts in each stove</td>
</tr>
</tbody>
</table>

Table No. 2 "Stove Comparison"

<table>
<thead>
<tr>
<th>Prototype</th>
<th>Stove of Caltech, FS, Maya Pedal</th>
<th>Traditional Stove</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approximate price</td>
<td>Q. 2,200 approximate</td>
<td>Q 1,400 approximate</td>
</tr>
<tr>
<td>Number of firewood (leña) used per month for a family of four people</td>
<td>One load of firewood (una tarea de leña)</td>
<td>One load and a half of firewood (una tarea y media de leña)</td>
</tr>
</tbody>
</table>
Conclusions:

- Mrs. Baran saves the equivalent of half load of firewood (medía tarea de leña) which costs Q 137.50 per month.
- Mrs. Baran used a load of firewood (una tarea de leña) in 20-25 days with the normal stove, and now with this improved stove uses a load of firewood in a month and a half.
- With the money they have saved, Mrs. Baran can pay for the chimney hat which costs Q 30.00.
The stove needed 30 pounds of cement.

\[30 \text{ lbs} \times 0.60 \text{ cents} = Q 18.00 \text{ (the quintal cost Q 60.00)}\]

There has also been the cost of 4 days for the bricklayer \(X Q 75 = Q 300.00\)

In saying that the stove is being used all day, is that she uses it for breakfast, snacks (refacciones) in the morning and afternoon, lunch, dinner, and to reheat meals. But, after every use she puts out the fire.

Mrs. Baran uses Ocote but not all the time, only in the morning when making breakfast and the rest of the day not. The ocote costs Q 1.50 each bundle contains 5 pieces, each piece measure 7 inches long and 2 inches wide. The Ocote is extracted from pine, from the specie Pinus oocarpa.

Mrs. Baran does not use bags or plastic bottles to start the fire. However, they are also unaware of the harm that could be caused from using plastic bags or plastic bottles in this way.

The hours a day they use to cook nixtamal in the improved stove = 1 hour, a normal stove = 3 hours

The hours to cook each meal:

- Breakfast = 2 hours
- Lunch = 2 hours
- Dinner = 2 hours
- Snacks = 2 hours in the morning
- Snacks = 2 hours in the afternoon

**TOTAL HOURS** = **10 hours.**

**Recommendations and Comments:**

There are many good designs for improved stoves to be done and other existing alternatives that are effective and would be interesting to try. For example, an improved stove of two levels, improved stove
of three levels, rocket of combustion saver branches of firewood, sawdust stove and pellet stove organic, this is an improved stove with oven (very similar to the one developed with a central chimney and two doors) and the circular oven of firewood (which also has an plate), among other alternatives. For sure these alternatives will be better than the traditional stoves, it is to discuss how to appropriate for people, or it is better a stove built, or bought or better armed by them.

PROTOTYPE 2: CORN SHELLER

Name and phone of partner/participant:
Juana Yac (502) 4085-4134
Candelaria Cumpar 5307-4735
Regina Hernández
Jesús Zabala
Paulina Baran
Juana Hernández

This version of the “corn sheller” is the result of a creative process that included students from Rafael Landivar University, CALTECH, and a volunteer from the Check Republic, Kamil Sutera.
The prototype consists of two overlapping pieces of 2-inch PVC water pipe, with three ¾-inch screws inserted where the pieces overlap. The purpose of the prototype is to provide a practical and effective tool for manually shelling maize. Also, it is a tool that can be manufactured easily with locally available materials. It is easy to use and had practical application in maize producing regions.

By August, the group had committed to assisting in this investigation by manufacturing more corn shellers. The idea of this group is to become a real micro business and coordinate with Fundacion Solar Microenterprise Program. The group thinks that someday they will not only sell in the market in Santa Clara, but in several markets.

Because the material used to manufacture this product is sharp and dangerous, the group needs safety gear, such as: Masks, goggles, gloves and others that are necessary for security. They also need: scissors for metal, drill, saws, lime, tips, hammers, nails, screwdrivers, pencils, and others tools to improve the manufacturing process. To avoid accidents during fabrication, Liz and I are worked together with them to provide more training for safe production.

By September, I had picked up the two tubes that Chris had paid for from the warehouse in Santa Clara and the screws from Sophie so the group could start making more corn shellers. Also, I tried to organize the group to sell on the market days in the Santa Clara market, but they said they would prefer to coordinate weekly amongst themselves.

During September, the group went to the Santa Clara market three times to sell the corn shellers. As a result of these sales trips, the group began discussions about selling in different markets, like in San Juan, San Pedro la Laguna, Chichicastenango, etc. Unfortunately, during the sales trips they sold barely enough corn shellers to cover
the transport costs of two people to the market and their lunches. The transport from Pasajquím to Santa Clara costs Q 12.00 per person and these trips two people need to travel. During these sales trips, the group was selling the corn shellers between Q3.00 and Q 5.00 per unit. The prices of the materials to produce 75 corn shellers were: 6-meter, 2-inch PVC pipe Q 75.00 per unit and 225 ¾-inch screws Q 0.35 each.

Also, during the week September 8 through 12, the group offered the corn shellers from house-to-house in the nearby villages, Palestina and Panyebar. In Palestina, they sold three units and in Panyebar, zero. One of the ladies has a husband who works in Zunil, Quetzaltenango, place with a lot of commercial agriculture. She said he will try to sell the corn shellers there. I told them I would try to sell them in San Juan La Laguna to the people who produce corn.

Also, in September, the corn was not ready for harvest. Since most people harvest corn in January and February, we thought it we might have better sales if we waited until January to start selling again.

In October, the group was still active with six members. They were working both in manufacturing and selling more corn shellers, but they had some problems in the market. One day, they sold very little, and they suggested it might be a good idea to change the product. They also thought it might be better to sell the corn sheller later at a later date, closer to the harvest.

By October, we had made seven attempts to sell the corn shellers (6 times in the market in Santa Clara and once in different villages). During all of the trips, we had problems selling it. I took some corn shellers with me to San Juan La Laguna to sell and I placed them in corner stores.
From the beginning, the ladies and I had been keeping inventories of the materials, both what we used and what is still available. By November, I had taught the group to keep their own inventories, to do their own inspections, and to keep everything in a notebook. Now, the notebook is with Candelaria Cumpar.

Also, during November, Sophie, a student from Rafael Landivar University came to demonstrate how the women could sell the product in the market in Santa Clara or in any market for that matter. In her opinion, the lack of experience, desire, and collaboration of the group were the reasons why the corn shellers were not selling. By that time, I had noticed the group would only sell in the market if I paid for the transportation. Also, Sophie had to do the same thing for the November 8 trip.

Conclusions:

- The money for the investment comes from: the three tubes were purchased by Caltech (two tubes have been used and one still available), and the screws were obtained from the sale of the corn shellers. These materials are obtained at the hardware store Agroferriluz in Santa Clara, with the owner Adrian, his phone number is 59813822
- Since Caltech left, the group has 34 hours of work. This is in addition to the hours spent with Caltech in the week when they learned how to produce the prototype.
- As of November 30, the group has manufactured 102 corn shellers.
- As of November 30, the total investment has been:
  
  NOTE: The screws that are being used now are ¾-inch.
  306 screws X = Q 0.35 each one = Q 107.10
  2 pipes of 6 meters long and 2 inches in diameter X Q 75.00 = Q 150.00
  TOTAL = Q 257.10
➢ As of November 30 the total number of corn shellers sold is: 28.

➢ Total corn sheller sales for the group (from August through Nov. 30 2008):

\[
\begin{align*}
10 \text{ at } & Q \ 5 \text{ each } = Q \ 50 \\
7 \text{ at } & Q \ 4 \text{ each } = Q \ 28 \\
11 \text{ at } & Q \ 3 \text{ each } = Q \ 33 \\
\text{TOTAL SALES } & = Q \ 111.00
\end{align*}
\]

Recommendations:

The corn sheller is effective, practical, economical and easy to manufacture. It is a product that could be useful for families who manually do this work. It is recommended we get more involved with the production and marketing of the corn sheller. Initial market tests indicated interest in the product at a local level but the women involved believe they will have better luck selling this product in other markets. To do this, they will need a lot of additional help, both organizational and commercial.

Comments:

If the ladies are serious about creating a business from the production and sale of the corn sheller, they may solicit the Fundación Solar for support for their group. However, institutional strengthening and marketing support for these women may not be possible until 2009 due to the current budget. Once the request has been received, an FS promoter will contact them and will visit to evaluate their potential as a group. Then, the program coordinators decide the next steps to take with the group.
PROTOTYPE 3: COMPOST LATRINE

Name and phone of partner/participant:
Martín Tuch       (502)  5055-0518

While in cities the ideal solution for human waste disposal is the construction of sewage systems and treatment plants, in rural areas, with low population density, a more viable solution, both technically and economically, is the compost latrine. The compost latrine is an alternative for managing the organic waste produced by human beings. The compost latrine is particularly useful in communities where there is lack of water or financial resources for flush toilets.

The compost latrine, as opposed to a pit latrine is often used in areas that have high water tables. Both types of latrines are cost effective and easy to construct but the compost latrine has the additional advantage of being able to compost or ferment the waste to be recycled as fertilizer.

Tecnología Para Salud (TPS), a Chimaltenango-based NGO, built the compost latrine prototype in the home of the Tuch family. The prototype was paid for with financing from CALTECH. Although this family already had a bathroom, it was in poor condition. Also, the Tuch family is a well-known and respected family in the community and since they were willing to try this technology and to disseminate it, they were chosen to receive the prototype.
The compost latrine is located less than two meters away from an existing sink. The latrine has an above-ground, cement-block, double chamber for the collection of solid waste. Two concrete lids cover the two chambers, usually one of the lids is in place on the chamber not in use, and the other chamber is covered by the “toilet bowl/seat” for solid waste evacuation. There are also two urinals for liquid waste: one is for men, and the other is for women and is built into the seat. The stall is has rustic wooden walls and laminate ceiling. Also, we installed a five-gallon plastic barrel to collect the liquid waste, while the solids are converted into compost inside the chambers. The chambers must be rotated every six months.

By August, Tuch family was using the compost latrine daily and during the last three weeks of July, the family had already collected 15 gallons (1 gallon= 3.78 liters) of urine. There are eight people in the family and each one was using the latrine an average of three times during the day. The family was using 2.5 pounds of ash every time they used the latrine. Also, they threw the toilet paper into the latrine, as well as, the remnants of food. The family learned quickly they had to “depeak” the settled faces at least once a month so it does not form a mountain in the collection chamber.

After using the latrine for approximately six weeks, they asked if there is any disinfectant or some other solution for the bad smell coming from the latrine when the temperature was high or when the wind was strong and if there was another material they could use instead of ash to neutralize the feces because this was hard to get in quantities large enough to be effective.

One of the main problems with this latrine prototype is that it does not have vents in the chambers. Also, the doors of the chambers do not fit well, so the odor escapes easily. So, our big challenge was to find an alternative for the ash to help eliminate the smell despite the design flaws. At that time, I suggested the family apply lime, litter,
and sawdust instead of just using ash and to see how effective those materials were.

By September, I had explained the family there was another option they could try: a mix—1/4 ashes/lime+1/4 wood chips or dry organic finely chopped mater like coffee grain peels or any dry small leaves + 2/4 soil. Also, I explained again, they needed to take a stick to level the content (which will normally form a pyramid shape) and this needed to be done so the mix could cover all of the feces completely and this should reduce or eliminate the odor.

The Tuch family started to use the new formula and do the recommended “depeaking” in September. They said they noticed a difference right away but that mixing a formula took more time and they had to go looking for the ingredients since only the ashes were produced in the house.

By October, the Tuch family was collecting 20 gallons (1 gallon= 3.78 liters) of urine per month. They had also been using the new mix and say the odor problem has improved. One of the comments I had was that the latrine has no vent and Luzmi said that this is one of the accessories the Eco Loo group plans to work on at a later date.

By November, the family was successfully using the latrine regularly. The smell had been reduced considerably thanks to the new formula.

Table 3 "Approximate quantities collected from the latrine"

<table>
<thead>
<tr>
<th>Number of people using the latrine</th>
<th>8 adults and three children</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quantity of solid in the first chamber at four and a half</td>
<td>Approximately half chamber full.</td>
</tr>
</tbody>
</table>
Conclusions:

- With the formula I recommended (1/4 ashes/lime+1/4 wood chips or dry organic finely chopped mater like coffee grain peels or any dry small leaves + 2/4 soil), I found an alternative to eliminate the bad smell coming from the latrine during the day when the temperature is high or when the wind is strong. Also, by mixing the formula they obtain more material for more time, because previously used only ash and they ran out quickly in the house.
- Amount of fertilizer applied and removed: The solids collected are not sufficient even to open the first chamber.
- Amount of urine produced, and its use: Approximately 359 lt. per month, the urine is collected and applied directly to the soil beneath the coffee.
- Satisfaction with the Latrine: The family Tuch says: “We are happy with the new latrine.”

Technical Recommendations and Comments:

It is recommended to locate the latrine compost far from sources of water and reservoirs for human consumption.

The design of the latrine should be revised to avoid unpleasant odors. We can improve performance by adding ventilation pipes covered...
fine wire mesh/screen (sparks mesh) (atrapamoscas) and “chimney hats”.

Besides ash, lime, sawdust, litter or a mixture of these can be used.

There is possibility of the liquid from the latrine in a French drain--underground with a filter of rocks (piedrín) and sand--when there is no possibility of turning it into something else (pesticide). To avoid having to apply on the soil area of the coffee plantation frequently or rather not use the latrine to urinate for moving the boat with liquid waste.

It is recommended to keep the lid of the seat closed when not in use to avoid the flies and other insects from entering the chamber.

Would it be possible to use a removable barrel in the chamber to collect the solid waste? It may be more effective, hygienic and easy to handle.

Also, it is recommended to review other possibilities for more hygienic chair for the latrine particularly with regard to the separation of solids and liquids.

PROTOTYPE 4: DRIP IRRIGATION SYSTEMS

Name and phone of partner/participant:
President of women’s group:
Candelaria Cumpar (502) 5307-4735
President of men’s group: Chema Zabala
(502) 5374-4208
Irrigation is an artificial procedure that is intended to provide water for plants to receive sufficient moisture so those same plants will develop and optimize their life cycles. Since water is a vital and scarce resource, drip irrigation systems as an effective solution to maximize its use.

In August, in women's garden, the group tried the system for the first time on their own and it did not work. They realized that one of the key parts was full of soil so they cleaned it and it started to function again. Now, the group always checks to make sure the system works properly.

With the men's group, since the installation of the system, they have been doing periodic checks to make sure the system works properly. They fenced off the Rotoplast tank area to prevent vandalism. Strangers were already coming with machetes to scrape the outside of the water tank. Also, all of the PVC pipes were buried to avoid further incidents. The group was waiting for Chris (Caltech Y) to send more about training that he would coordinate with any company. In this case I am going to coordinate with Duke, he said he will travel to Pasajiquim once a month after August train the group in skills and anything else they need to maintain and manage the system.

Still, during the months of September and October, when there was still rain, neither system was used much. Both the women's and men's groups always had a fear strangers would jump the fence and damage the pipes and steal their harvests so they have been
protecting the systems and their crops. The men’s group determined they need additional fencing the northern part of the area, approximately 55 meters. They sought roofing sheets (laminas) to cover the Rotoplast tank. I told them I would coordinate with Lester Alfaro, the coordinator of the Agroforestry program and of all vegetable gardens, to cover these materials.

Both groups asked for spare parts to be used later. I explained to both groups that this was not acceptable and that they needed help themselves when it came to keeping the system running.

By November, the rains had almost stopped for the season and the men’s group began to using the system around November 15. As of November 30, all I have heard are positive comments from the men’s group. Also, the men made calendar to schedule their shifts. They are convinced they will save time and money with the system. They started to take turns irrigating the crops in the vegetable garden and each person is responsible for one to two hours per day. They used the system three or four times per week depending on the weather. They noted their work is more efficient and faster.

In November, owner of the land of the women’s garden advised them he does not want to rent the land anymore. Their system will be moved to another vegetable garden in Panyebar. Fundación Solar has several vegetable gardens in different communities and Blanca Perez (Supervisor Gardens), Lester (Coordinator Agroforestry Program) and I decided to move the system to Panyebar because this is a well organized group. They are all hard workers and they produce excellent results every season.
Conclusions:

Advantages of drip irrigation systems--

- High savings, between 40 and 60% water with respect to traditional systems of irrigation;
- Significant reduction in manpower—not only in monitoring the watering but, above all, by the lower incidence of weeds in the crop;
- Major savings in plant protection products and fertilizers.
- Notably increased production yields; and
- Makes use of waste water, as in the case of Pasajquim men’s garden, that the water comes from an overflow.

Recommendations:

Development is met when a project helps people expand their options. Development is not charity; there is a huge difference. We need people that are able to come up with creative contributions for their needs, particularly with respect to spare parts and other components of these systems.

The groups are happy with the systems because they expect to save time and money.

The men’s group also wanted to participate manufacturing the corn sheller. When Enrique, vice president of the men’s group mentioned this, I said they could not do this. This is the women’s group project and they needed to respect it.
Prototype 5: Pedal Power

Name and phone of partner/participant:
Enrique Morales (502) 4085-4134

Prototype 5 is a bicycle generator created by Mr. Carlos Marroquin of Maya Pedal, based in Itzapa, Chimaltenango. The generator works when pedaling. This energy is used to charge a battery which can then be used to power lights, a small radio, or a television for a few hours.

Mr. Marroquin found while working with the CALTECH students and other participants he could modifying the prototype with a more efficient power converter to charge the battery. He discovered he could achieve acceptable results with this modification. One could pedal for a little less than one hour for more than six hours of light from a small light bulb. Mr. Marroquin most encouraging result was pedaling for one hour and producing more than 10 hours of electricity.

However, from the perspective of the CALTECH students, the machine was not efficient enough. They offered two suggestions for modifying the idea in several ways: 1) improving the converter and 2) improving the friction of the wheels, to not use the battery (which is how to save energy).

In July, the bicycle generator was introduced on the market in Santa Clara, with the changes made and no battery. The CALTECH students suggested using LED flashlights for people with communal battery, to avoid excessive expenditure on regular alkaline batteries.
Enrique Morales and I have been for Carlos Marroquin to return from the United States to continue the project. Since the prototype did not work, I have not been able to do much with this activity.

Conclusions:

Because the prototype is not working the results are inconclusive.

Recommendations:

None

PROTOTYPE 6: WHEELCHAIR

Name and phone of partner/participant:
Delfina (502) 4178-7433
Centro Maya para personas discapacitadas “Xequiaq’asiguan”, San Juan LL. (502) 5849-2115

I interviewed, Delfina, from the Centro Maya, to find out what happened with the wheelchair prototype. The following are the comments that came from this interview:

- Delfina actually used the chair but just on the grounds of the Centro Maya. She said she was afraid to use it on the street because she felt unsafe in it.
Delfina is accustomed to taking her chair in a tuk-tuk (a three-wheeled motor taxi), but she could not take this prototype because it was too big.

The tires are uneven.

The backrest folds when the person in the chair leans back.

Delfina got very tired while using the chair because it is wide and very open.

One advantage the chair has is that the tires are wide and easy to handle on poor roads.

The tubes that support the arms are very high and this hurts the arms.

By September, I had reached Joey from Transitions in Antigua. He came to pick up the chair to make the adjustments suggested by the testers and Paulina from IMI who is also working on new designs for wheelchairs. The chair that Paulina had in San Juan is at the IMI workshop. As of November 30, the original prototype is being analyzed and critiqued for design flaws. Paulina said that Juan Carlos had another chair and on November 11 he had a presentation with CALTECH.

Recommendations:

It is recommended that items such as wheelchairs should get more specialized treatment and attention with respect to testing, production and sales. In this case, there was not enough follow-up with the chair to make anymore recommendations. According to the user, however, it was very impractical for carrying around, being unable to fold (for example, for putting it in a tuc tuc or small car).
PROFILE INFORMATION FOR HONEY PRODUCTION PROJECT

Honey is an important product for the lake Atitlan basin. Some 60 families have this production within their coffee plantations and agricultural plots mostly in the area of greatest poverty, the villages in the municipality of San Juan La Laguna.

The production of honey is particularly interesting for investment for the following reasons: 1) It fits in well with a system for agro-forestry and the production of organic coffee and other crops, 2) the increase of tourism in the southern lake basin and the multiplication of businesses in this sector which use this product on their menus particularly for breakfast and 3) the recovery of 190 cuerdas with the majority being planted coffee systems and / or other agro-forestry systems.¹

There are a few problems with the production of honey which must be considered in any proposal to expand production. The first is the tendency of bees become aggressive for crossing genetic native bees with Africanized bees. The second problem is that production is highly susceptible to any climate changes and/or pathogens. However, a group of producers based in Palestina, has survived for many years with this production as their primary source of revenue and has shown that it is possible to produce in this area.²

² Ibid.
Both the production and marketing of honey and other products derived from the practice of beekeeping require an investment in genetic material (new queens), as hives equipment and machinery for processing.

To take advantage of these opportunities for the benefit of producers and consumers would be required to invest in the following activities in areas producing honey around Lake Atitlan:

1) Provide technical support and trade associations of beekeepers in the area
2) Make a complete analysis of cost/benefit for the production of the area
3) Making a market study for products derived from beekeeping, including honey
4) To provide all the materials, equipment, plant and equipment to expand production
5) To build and equip a center for collecting and processing
6) To comply with the requirements of organic certification and fair trade (to enter international markets).

**POPULATION OF SAN JUAN LA LAGUNA:**

Total population of the municipality for 2004 is 10,177 habitants of which 55.27% living in San Juan (the town). The rural population is divided between the 3 villages: Panyebar with 2,228 habitants, Pasajquím with 1,340 habitants, Palestina with 984 habitants.

**Political-Administrative Division**

San Juan is divided into four population centers: a town, which is the municipal and urban area of town and three villages. These are
accessible by car via Santa Clara, roads by foot. According to that mode of transport being used, are at the following distances from the header:

<table>
<thead>
<tr>
<th>Population Center</th>
<th>Category</th>
<th>Distance from Municipal Capital</th>
<th>Access</th>
<th>Travel Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Palestina</td>
<td>Village</td>
<td>14.5 Kms</td>
<td>Paved road</td>
<td>1 hr.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 kms</td>
<td>Path</td>
<td>45 min.</td>
</tr>
<tr>
<td>Panyebar</td>
<td>Village</td>
<td>18 Kms</td>
<td>Paved road</td>
<td>1 hr. 15 min.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5 kms</td>
<td>Path</td>
<td>2 hr.</td>
</tr>
<tr>
<td>Pasajquím</td>
<td>Village</td>
<td>22 Kms</td>
<td>Paved road</td>
<td>1 hr. 30 min.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8 Kms</td>
<td>Path</td>
<td>2 hr. 30 min.</td>
</tr>
</tbody>
</table>

Population Centers:

<table>
<thead>
<tr>
<th>Place Name</th>
<th>Category</th>
<th>No. of Residents</th>
<th>No. of Families</th>
<th>No. of Houses</th>
</tr>
</thead>
<tbody>
<tr>
<td>San Juan La Laguna*</td>
<td>Municipal Capital</td>
<td>5,625</td>
<td>1125</td>
<td>937</td>
</tr>
<tr>
<td>Palestina°</td>
<td>Village</td>
<td>984</td>
<td>217</td>
<td>190</td>
</tr>
<tr>
<td>Panyebar°</td>
<td>Village</td>
<td>2228</td>
<td>407</td>
<td>366</td>
</tr>
<tr>
<td>Pasajquím°</td>
<td>Village</td>
<td>1340</td>
<td>306</td>
<td>260</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>10,177</td>
<td>2,055</td>
<td>1,753</td>
</tr>
</tbody>
</table>
Agricultural Production

Village Pasajquím for being the warmest village produces corn, beans and coffee. Most of these inputs are sold in the local market, the town in San Juan or in the plaza of Santa Clara La Laguna, and those with the greatest production sold in the wholesale markets in Quetzaltenango or the capital city.

Animal Husbandry

A few families (one in ten in Pasajquím), have cows, which are used to produce milk and cheese, but also for meat.

FINAL RECOMMENDATIONS AND REFLECTIONS ABOUT THE PROGRAM

Regarding the process of technology transfer, there appeared to be a lack of understanding on the part of the community with what a “prototype” means. Some of the people who received the prototypes thought that they were supposed to work “perfectly”. The idea that
a prototype is a “work in progress” seemed to be misunderstood by many. There was great effort on the part of the Fundación Solar to address and document any problems. However, often it was observed that the community was reluctant to “complain” or acknowledge problems because they saw the prototypes as a “gift”. Next time, more attention should be paid to helping the families understand they are receiving new technology that may or may not improve their living situation and make sure they understand that the prototypes are not “gifts”. Even though the families did not pay out-of-pocket for the prototypes, they were “paying” for them (de facto) by contributing useful information about their effectiveness and efficiency.

Regarding the materials used to manufacture the prototypes, there needs to be a greater effort to include more natural materials for some of the systems, for example, a drip irrigation system made from bamboo, or some other hollow reed. In as much as all of the materials used were locally available, some of the prototypes required significant financial investment thus rendering them less accessible to the poorest of families.

Regarding the impact of introducing new technologies in existing systems, there needs to be more effort to analyze the potential negative effects of introducing certain technologies into these communities. For example, there was no information available about where to place the compost latrine with respect to the house and whether or not it should be placed near the source of drinking water or whether the use of liquid waste from the latrine maybe deposited on nearby coffee plantations without negative consequences.

Regarding aesthetics and functionality, both are equally important factors to consider even in communities perceived as “impoverished” particularly if (eventually) families in these communities will be
paying for these products. The Mayan market is like any other market and what works and what looks good will sell better than what does not.

Regarding monitoring and follow-up with the families, it is recommended the Field Coordinator be contracted full-time. It was extremely difficult to manage multiple functions with the prototypes, study, and continue the work for the Fundación Solar. In as much as the inter-institutional relationship was beneficial and strong, the Field Coordinator was the primary link and needed more time to fulfill this position.

Regarding the program itself, there needs to be more attention paid to the community's understanding of the real objectives and goals of the program. The lack of assessment tools for prototyping and performance of components was a severe limitation.

The results from this inter-institutional experience in the village of Pasajquím are important for future work in the geographic area and in developing appropriate technology products for these new markets. We must deepen our understanding of the culture through education and being open to different ways of transforming reality through technology. It will be interesting to continue this process of creating an opening for more collaborative work and a broader perspective about technology at a community level.
ANNEXES

ANNEX 1: MAPA GEOGRAFICO DEL MUNICIPIO DE SAN JUAN LA LAGUNA, SOLOLA.

Sta. María Visitación
Sta. Catarina Ixtahuacan
Palestina
Caserío Cipresales
Cantón Chuacanac.
Panyebar
Pasajquíam
Cantón Chofiero
Chicacao
Suchitepequez

San Pablo L. L.
Santa Clara L. L.
Lago de Atitlán
San Pedro la laguna.
FIRST SURVEY
a partnership APIFLOR
With regard to honey and current operations.

1. ¿How honey do they produce a year? Can they sell it all?
   480 quintals
   they sell all the honey.

2. How many hives do they have?
   There are 800 boxes of bees

3. Where the bees can find the flowers? What kind of flowers are they? Are those
   Close to where you have the hive?
   The bees find flowers in the same area
   the types of flowers are wild

4. How is the quality of the honey?
   The quality of honey is considered organic aromatic with low humidity.
   MOSCAMED did a study that honey from this region is one of
   the best in the country, because it is free from contaminants.

5. Who buys your product? Are they always the same people? How
   do you communicate with them? *(As you know when they want
   to buy honey)* how often will come to buy these people? Each time
   a person comes to buying how much quantity of honey purchase?
Several companies one of them is POVAS from Coatepeque. The association sells honey to this company and others from the departments of San Juan Sacatepequez, Totonicapán, and so on. The buyers are communicated through the directive of the partnership (APIFLOR) or with the same partners. People come to buy from November to May. The companies each year come to buy a total of 300 quintals of honey and 150 quintals other different people.

6. At what price you sell honey? At what price buyers sell their honey? Where do you sell? What prevents you earn more for their honey?

The prices are not stable range from Q700.00 to Q800.00 per quintal,
In March and April honey weighs more because it has a good content of avocado bloom, and when there is a good percentage of flowering of coffee honey weighs less.

7. Please describe the process used to raise bees, harvesting honey, and filter honey. How long does it need to carry out every part of the process? How many people are responsible for making honey? Do they have problems and difficulties with the process? What are they?

After the last harvest in May, increasing the number of hives. It starts with feeding with sugar syrup and incaparina, these are substitutes for pollen. In the month of July is against barroa applying Flumentrina. In the month of September and October with wax stamped. In November, the first harvest, this stage onwards no longer applies any kind of medicine, no food sugar because if applied at this stage the product of honey would be contaminated.
8. What you spend to make honey? How much does it spend?
This project will spend more in the following description:
  wax stamped, requires beehive, 5 lbs X Q 60.00 Q = 300.00
  sugar, which costs Q 200.00 per quintal

Materials they need to buy:
  stainless steel utensils, barrels, extractors, bottles, knives, blades, etc. They have asked FONAGRO and other institutions such materials, but they do not respond, this is a project that costs about Q 490000.00. If these materials have the association has tools for the efficient process of honey.
  Also they want to buy 400 boxes of pollen = Q60000.00 for beekeepers to sell pollen for other regions.

9. What about the honey after they sell? Is it processed? Is bottled?
  Packaged in the company OSITO.
  Exported abroad in barrels.
  Local and national levels for Easter marketing
  sweets (sweet o dulces típicos of Antigua Guatemala)

10. What is the biggest problem you have at the moment?
  Lack of equipment
  Lack of capital

11. How do you want to help you?
  Getting any company of USA that is interested in the honey of the association,
  Because it is a product organically.
  Getting funds for utensils or equipment.
12. What are their hopes and goals for the business?
   Growth with beekeeping to a level of 2000 boxes of hives.
   Exploitation of pollen.
   Working with royal jelly.
   Working with propolio (wax medicine that is based cough syrups and other diseases).
   A growing up of queens.

Questions regarding possible projects

1. What materials are available?
   Centrifuge of 4 baskets
   Centrifuge manufactured in Coatepeque of lamina galvanized.
   Blades
   Knives
   Pavilions
   Embasado honey in plastic barrels

2. Do you have access to electricity?
   Yes

SECOND SURVEY
Information on the team that beekeepers want to improve.
Focus on the centrifuge, but it would also be of great benefit to the Beekeepers use of top-bar hives that would allow them to return to using diapers.

Find out about specific complaints that have beekeepers on the centrifuge what do they want to improve?
R. Beekeepers say the drain (it gives the speed around the extractor) is a problem for them because this is like a screw that is easy to come out or slips into place when they work, then had to soldiers to stay secure and sealed. They too are convection that each year the
technology continues to progress and change the extractor they think they have now and buy some project or request an extractor of stainless steel. Now they have the idea of exporting honey abroad and the demands requires some standards and companies seek to be a pure and organic honey as are characterized them as well, then this centrifuge that they currently have contaminate the honey.

**Dimensions of current and the centrifuge parts.**
Diameter = 1 barrel
Height = 1 barrel of 54 gallons

**what is made of?**
R. is made of galvanized sheet

providing photographs and drawings, this will help a lot. The same is to help the bees.
I have made a cd of pictures and a cd I filmed with a beekeeper Pedro Mendoza.
These materials I sent it with Luzmy to the states.

Also, the association would be willing to buy a centrifuge that could be transported and shared among all its members?
R. the partners are willing to buy another extractor but of stainless steel material and using it by rotation.

**Are they able to pay?**
Depending on the time they are living, for example in the winter months things for them are expensive and difficult to get money and they could pay Q 500.00 per person.
Find out what materials are available both to be bought, and things that would not have to be purchased. They have the majority of tools available to work in honey production as Rasquetas, spatulas, knives, centrifuge-extractor, sepillo, or veil masks, gloves, and smoker.

**Materials not available**: pavilion (pabellon).

Find out if the materials, utensils are made of stainless steel, other metals, plastics, glass, and paints and coatings that are available. These are all constructed of metal, galvanized sheet and with local material.

**Do you have power tools or hand tools?**
All the tools they have are hand tools.

**Are there people in the area that can perform skill trades like welding, metal trades or similar?**
There are people who build these materials, only the extractor builtd in Coatepeque, Quetzaltenango, a city that is on the border of Mexico and Guatemala.

**As these services cost, which would be useful?**
Scraper $Q = 125$, spatulas $Q = 75$, $Q =$ blades $200$-centrifuge extractor $Q = 8000$, sepillo $Q = 50$, or veil masks $Q = 75$, $Q =$ gloves $200$, $Q =$ flag $1500$.

Every effort will be made to seek buyers in the U.S., but the purpose here is to design a product that helps to increase production and improve its product so that U.S. companies interested in buying it. We need to tell them how is the best way to do it.
Will it raise more revenue in order to increase the amount they produce?  
Of course, they are subject to any change or aid they receive, as long as the product is becoming better.

Would it be better to make honey cleaner and better quality first and then increase the production of hives?  
Much better, because what we are trying now is to get a good market for this product and hopes to be recognized for the quality of the honey.

It will be a new centrifuge to be the most useful, a filtration system, or improve the hive?  
They always prefer first the centrifuge stainless for the honey and hope to be exported with better quality and free of contaminants.

If a new centrifuge is what they want, what is needed to change it?  
What they want is always changing this one they have now for a centrifuge of stainless steel, and the size is always normal.

What size or ability?  
1 barrel = 54 gallons

Is it too heavy and difficult to transport?  
Yes, weighs 125 pounds and difficult to transport it, as they rotate in use.

How big should it be?  
As the size of the centrifuge of stainless steel this is lighter.
Is it hard to operate?
Easy, while the design is operated by hand, manually is always tired for them.

If you have an engine? Can we use the power of a bicycle?
An engine work would be easier and reduce costs, and with a bicycle would be a good idea.

Can you tell us what months, avocado and coffee blossom and flourish?
The wildflowers bloom in summer, in March-May
the avocado blooms in February and March
Coffee flowers in April and May
the gravilea blooms in March
the hinges (cuxín) bloom in January-April

Questions from the previous survey

Of the 800 hives:
The 800 boxes of hives belong to the association, are among to the 30 partners. The partner that produces less has 10 boxes, and the partner who produces more has 300 boxes.

Provide more information on the partnership:

Who are who and who?
Apiflor is the name of the association, and consist of the following communities: San Juan, Palestine, Panyebar, Pasajquím, Santa Clara, Santa Maria, Santa Catarina Ixtahuacán, Nahualá, St. Lucia, all these communities belong to the department of Solola.
The president of Apiflor: Jeremias (from Palestina), the Secretary is Fabian Rodriguez (from Santa Maria). For all the association are 30 beekeepers in various communities mentioned. This group of people
started with this work empirically, as they do in this region is used to consume the honey by the Guatemalan culture only in the holy week. But with the importance given to it now, this group is trying to give talks in schools to encourage children in this race, today to be beekeeper is a thing of our grandparents, uncles and adults. This group of people has a meeting every 3 months to discuss the major problems that are attacking them, as well as the increase in hives and quotas that must provide annually, they pay Q 10 per box per year, which is to sustain the association. One of the important topics they discuss is about the quality of honey, because they are characterized in producing an organic honey, so now they are trying not to apply chemicals to manage the hives.

Whose is the largest amount of money they use?
They have a partnership but each person using their own assets or money.

How long has been running the association?
2 years

How long Ezequiel has been raising bees?
3 years

how many hives have Ezequiel?
20 boxes

Does it cost anything to work with this group?
Moscamed did not receive even a single centavo for the training during the 2 years, and now most of the beekeepers associations are technicians.
Is honey really officially certified as organic?
Moscamed did the study that honey of this partnership is organic.

What is the percentage of purity and quality that honey is qualified?
The honey is 100% organic, for now I find out more with the technical Moscamed who gave them training.

What is POVAS?
Povas is the only company that is buying the production from the association and is responsible for exporting it in plastic and stainless steel barrels.
Povas exports honey to Germany and the U.S.
Povas is an agricultural trading company that sells products from Coatepeque, and Quetzaltenango: wax stampings, smokers, and tools to manage the hives.

Who are the people who actually buy honey beekeepers?

Are agents of the companies?
The only company who buy honey to the association is POVAS.

Coyotes?
There are people who come from different parts of Guatemala and then they are going to sell at the terminal of the city, or in restaurants.
The coyotes are the ones who sell the honey to Osito, and then the Osito Company bottle its product for sale in supermarkets.

Local people?
Every beekeeper has provided its customers at the local level; it is also consumed for Easter, for medicine, to restaurants, hotels, and so
Are the bees dying because of the obvious disease in the area or is a general trend?
The bees are dying from diarrhea, barroa (insect that weakens Honeybee), mites, but this plague is nothing more for this area, is a general problem.

Are there enough flowers for them?
Yes

Apply pesticides in the area?
For most farmers in this region do not use pesticides inside the coffee, work is always manual.

Please find out how beekeepers starting new hives.
Through formation of nucleo, is selecting several groups of bees from different boxes and make a new hive.

Buying a beehive with a colony already established there?
Depending on the value of each hive box, and they also sell their hives to other people.

¿Build the hive of bees and then transferred it into a colony?
Yes

What is the usual practice?
A honeycomb seal
A honeycomb breeding - larva
A honeycomb huevesillo

the result is a nucleus, which is also equal to a box.
Where and how to get the bees? There is more than one source?
You can buy with the same partners Apiflor.

How is the sugar syrup made and used?
It is made with normal sugar and normal drinking water, in a bottle of 708 ml and 2 lbs of sugar.

Application: the bottle of water and sugar are mixed, put into a plastic bag of 5 pounds, with a fine needle pricked 3 times the bag, then placed the bag inside the box hive.

What is Incaparina composition? (People here have never heard of Incaparina).
The Incaparina consists primarily of corn flour and soy, calcium carbonate, iron, vitamin A and vitamin B.

What is Flumentrina composition?
The flumetrina works well to stop the varroa mite. However, I have not been able to find the composition yet.

How they use the extractor:
With regard to the extractor: Each time they use the equipment, they coat the inside with wax or the waste wax so when they take out the honey, it is not contaminated with rust.
## ANNEX 3: TOOLS THAT THE HONEY BEE GROUP WILL BE USING TO MODIFY THE CENTRIFUGE

<table>
<thead>
<tr>
<th>No.</th>
<th>HERRAMIENTAS</th>
<th>COSTO/U</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Lijas (sand paper)</td>
<td>Q5.00</td>
</tr>
<tr>
<td>2</td>
<td>Discos para pulir (polishing disks) No. 9</td>
<td>Q25.00</td>
</tr>
<tr>
<td>3</td>
<td>Discos para cortar (Cutting Disks) metal número 9</td>
<td>Q30.00</td>
</tr>
<tr>
<td>4</td>
<td>Aceite (oil) Litro</td>
<td>Q27.00</td>
</tr>
<tr>
<td>5</td>
<td>Thiner (thinner) Galón</td>
<td>Q60.00</td>
</tr>
<tr>
<td>6</td>
<td>Madera (Wood) - pregunte por pie tablar</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Sierras ( corta hierro)</td>
<td>Q12.00</td>
</tr>
<tr>
<td>8</td>
<td>Cemento (cemento)</td>
<td>Q60.00</td>
</tr>
<tr>
<td>9</td>
<td>Lazo (rope) vara</td>
<td>Q6.00</td>
</tr>
<tr>
<td>10</td>
<td>Arena (sand) Mt</td>
<td>Q130.00</td>
</tr>
<tr>
<td>11</td>
<td>Goma (glue) 1/4 Resistol</td>
<td>Q35.00</td>
</tr>
<tr>
<td>12</td>
<td>waipe ( lb)</td>
<td>Q10.00</td>
</tr>
<tr>
<td>13</td>
<td>Electrodos (electrodes) Lb</td>
<td>Q20.00</td>
</tr>
<tr>
<td>14</td>
<td>Lamina ( 10 pies)</td>
<td>Q83.00</td>
</tr>
<tr>
<td>15</td>
<td>Tornillos (screws) 2 pulgadas X 1/4</td>
<td>Q4.00</td>
</tr>
<tr>
<td>16</td>
<td>Alambre ( Lb)</td>
<td>Q7.00</td>
</tr>
<tr>
<td>17</td>
<td>Parches para tubo (tube parches)</td>
<td>Q1.00</td>
</tr>
<tr>
<td>18</td>
<td>Tubo pvc., o tubos en general (tubes) 1/2 pulgada pvc</td>
<td>Q22.00</td>
</tr>
<tr>
<td>19</td>
<td>Cualquier tipo de plastico que vendan (plastics)</td>
<td>Q15.00</td>
</tr>
<tr>
<td>20</td>
<td>Cedazo 1/4</td>
<td>Q15.00</td>
</tr>
<tr>
<td>21</td>
<td>Acero angular (angular steel)</td>
<td>Q114.00</td>
</tr>
<tr>
<td>22</td>
<td>Acero plano (flan steel) 1/2 pulgada</td>
<td>Q90.00</td>
</tr>
<tr>
<td>23</td>
<td>Brocas (drill Bits) 1/4</td>
<td>Q5.00</td>
</tr>
<tr>
<td>24</td>
<td>Cables de tension (tension Cables) Número 10, mt</td>
<td>Q5.50</td>
</tr>
<tr>
<td>25</td>
<td>Desatornillador</td>
<td>Q15.00</td>
</tr>
<tr>
<td>26</td>
<td>Barreno (drill)</td>
<td>Q590.00</td>
</tr>
<tr>
<td>27</td>
<td>Toneles (tonels)</td>
<td>Q120.00</td>
</tr>
<tr>
<td>28</td>
<td>Tuercas</td>
<td>Q4.00</td>
</tr>
<tr>
<td>29</td>
<td>Piedrin (gravel)</td>
<td>Q280.00</td>
</tr>
<tr>
<td>30</td>
<td>Clavos, lb</td>
<td>Q8.50</td>
</tr>
<tr>
<td>31</td>
<td>Pintura de aceite (oil paint)</td>
<td>Q80.00</td>
</tr>
<tr>
<td>32</td>
<td>Pintura de agua (water paint)</td>
<td>Q50.00</td>
</tr>
<tr>
<td>33</td>
<td>tubo proceso de 1” y 1.5” los 6 metros cuestan</td>
<td>Q45.00</td>
</tr>
<tr>
<td>34</td>
<td>pintura en aerosol (spray paint)</td>
<td>Q20.00</td>
</tr>
</tbody>
</table>

FERRETERÍA AGROFERRILUZ, Santa Clara, Solola. Tel: 5981-3822
<table>
<thead>
<tr>
<th>No.</th>
<th>NAME</th>
<th>TELEPHONE</th>
<th>ADDRESS</th>
<th># OF HIVES</th>
<th>QUANTITY OF HONEY PER YEAR (IN QUINTALES--100 LBS)</th>
<th>2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Juan Alberto Cholotío Quic</td>
<td></td>
<td>San Juan</td>
<td>61</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Jua Luis Cholotío</td>
<td></td>
<td>San Juan</td>
<td>60</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Nicolas Vasquez Ixtamer</td>
<td></td>
<td>San Juan</td>
<td>80</td>
<td>26</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Felix Miguel Hernandez</td>
<td></td>
<td>San Juan</td>
<td>37</td>
<td>8.8</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Dionicio Vicente Puac</td>
<td></td>
<td>Panyebar</td>
<td>175</td>
<td>54</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Rafael Gonzalez Monroy</td>
<td></td>
<td>Panyebar</td>
<td>206</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Gabino Menchú Ajpacajá</td>
<td></td>
<td>Palestina</td>
<td>150</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Jeremías Dionicio Cach</td>
<td>45654417</td>
<td>Palestina</td>
<td>72</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Moisés García Lopez</td>
<td></td>
<td>Palestina</td>
<td>48</td>
<td>11.2</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Teodoro Saloj Yax</td>
<td></td>
<td>Palestina</td>
<td>100</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Jesús Augusto Ecomac</td>
<td></td>
<td>Santa Clara</td>
<td>90</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Fabián Rodríguez Reyes</td>
<td>56373735</td>
<td>Santa María</td>
<td>354</td>
<td>105</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Edy Abimael Rodríguez Sosa</td>
<td></td>
<td>Santa María</td>
<td>36</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Magda Marisucel Sosa</td>
<td></td>
<td>Santa María</td>
<td>36</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Cruz Guarchaj Tzep</td>
<td></td>
<td>Pacaguex, S C 1</td>
<td>35</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Manuel Catinac</td>
<td></td>
<td>Pacaguex, S C 1</td>
<td>47</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Manuel Guarchaj Tzep</td>
<td></td>
<td>Pacaguex, S C 1</td>
<td>30</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Martín Tuch</td>
<td>SOS50518</td>
<td>Pasajquím</td>
<td>22</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>No.</td>
<td>NAME</td>
<td>AMOUNT RECEIVED FROM MIDDLEMEN IN 2007 (Q)</td>
<td>TOTAL AMOUNT RECEIVE FOR DIRECT SALES (LOCAL MARKET) 2007</td>
<td># OF FAMILY MEMBERS WORKING IN THE BUSINESS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-----</td>
<td>------------------------------------------------</td>
<td>------------------------------------------</td>
<td>-----------------------------------------------------------</td>
<td>---------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Juan Alberto Cholotío Quic</td>
<td>Q7,500.00</td>
<td>Q9,000.00</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Jua Luis Cholotío</td>
<td>Q6,000.00</td>
<td>Q7,200.00</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Nicolas Vasquez Ixtamer</td>
<td>Q11,250.00</td>
<td>Q9,900.00</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Felix Miguel Hernandez</td>
<td>Q3,000.00</td>
<td>Q3,600.00</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Dionicio Vicente Puac</td>
<td>Q30,000.00</td>
<td>Q9,000.00</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Rafael Gonzalez Monroy</td>
<td>Q15,000.00</td>
<td>Q3,600.00</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Gabino Menchú Ajpacajá</td>
<td>Q22,500.00</td>
<td>Q7,200.00</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Jeremías Dionicio Cach</td>
<td>Q7,500.00</td>
<td>Q5,400.00</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Moisés García Lopez</td>
<td>Q7,500.00</td>
<td>Q900.00</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Teodoro Saloj Yax</td>
<td>Q7,500.00</td>
<td>Q5,400.00</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Jesús Augusto Ecomac</td>
<td>Q7,500.00</td>
<td>Q5,400.00</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Fabián Rodríguez Reyes</td>
<td>Q50,000.00</td>
<td>Q18,000.00</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Edy Abimael Rodríguez Sosa</td>
<td>Q3,750.00</td>
<td>Q2,700.00</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Magda Marisucl Sosa</td>
<td>Q3,750.00</td>
<td>Q2,700.00</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Cruz Guarchaj Tzep</td>
<td>Q3,750.00</td>
<td>Q2,700.00</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Manuel Catinac</td>
<td>Q4,500.00</td>
<td>Q2,700.00</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Manuel Guarchaj Tzep</td>
<td>Q3,000.00</td>
<td>Q1,800.00</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Martín Tuch</td>
<td>Q3,750.00</td>
<td>Q1,800.00</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPECIES OF FLOWERS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-----------------------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>palo de taxisco</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>avocado</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>aliso</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>coffee</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

According to Don Jeremías, there are at least 10 species of flowers that are found on the weeds in the area or are wild flowers that they have not identified with names.
ANNEX 5: STOVE SURVEY

Do you have a wood-burning stove?
The 10 interviewees answered yes

Is it enclosed?
9 people responded: No, and a person answered: Yes

What is it made of?
People responded with different types of materials, with cement and brick, block, cement block and brick.

Did you pay for it?
The 10 people responded: Yes

How did you afford it?
7 people responded: the stove cost between Q 500 to Q 600, and 3 people answered that they did not remember.

On a scale of 0-20, how Bothersome is the smoke?
The 10 interviewees answered: Yes it bothers a lot and it is one of the biggest problems in the kitchen.

On a scale of 0-20, how concerned are you about the health effects of the smoke?
The 10 people responded that they are concerned about this problem and that can affect the lungs.

Do you use the stove for purposes other than cooking (such as warmth)?
The 10 people answered that they have nothing more for a single purpose in cooking.
Would you be willing to modify your stove?
The 10 people responded: Yes

What do you like most about your stove?
The 10 people responded, that is great, it does not consume a lot of firewood (leña).

What do you like least about your stove?
The 10 people responded: the smoke, and the way how it is constructed.

The measurements of a load (una tarea de leña) of firewood are:
3 meters long
1 meter high
50 cms the length of each piece of firewood (leña)
5 to 15 cm diameter of each piece of firewood (leña)
and the value of load (una tarea de leña) of firewood is Q 275.00

Collecting Water Survey

1. What type of roof has your home?
The 10 people surveyed, 9 have blade roof (techo de lamina) and a person who has roof cement.

2. What is your main supply of water (river, lake, ocean, well, jet (drinking water or agua potable), etc.)? How far is it from your house?
   All of the 10 people have drinking water (agua potable) and is in the courtyard of their houses.

3. Where do you get water to drink?
The 10 people consume drinking water (agua potable)
4. Do you think that the water that you consume is clean?
The 10 people responded: yes, but may be it has to be purified.

5. How much water your family consumes a day? In a week? (Barrels or bottles, etc.).
The 10 people answered: 2, 3, 4 and 5 liters

6. How do you transport the water to your house? How do you store your water?
The 10 people answered that they have their own water at home.

7. Have you or your family been sick for drinking non-potable water?
The 10 people responded that NO

8. What do you want to taste the water you drink (refreshing, and so on.)
the 10 people responded: refreshing

9. Do you collect and / or you use rainwater? How?
They answered: sometimes, when there is need, no, yes

10. Are you interested in having a system for collecting rainwater in your home?
The 10 people responded: when is necessary, if there is a chance would be excellent.
The food drier is going to be an appliance that works with the sun. People may dehydrate fruits, vegetables or herbs with it and produce other things to sell in the village or using it to their house. They can sell all the vegetables and fruit normally, and all the waste they can dehydrate.

For farmers or future users of dried fruit / vegetables / herbs what type of product they harvest or plant?
10 people responded coffee, corn, beans.

The harvest fruit or vegetable is their first form of income?
10 people responded that it is just for family consumption.

What type of vegetable or fruit crops that can be sold easily?
10 people responded: potato, orange, peach, and avocado.

There are some vegetables or fruit that is ruined before finishing for sale?
10 people responded, potato.

Do they have the surplus of vegetables or fruits?
10 people responded: NO

how long do they dehydrate a fruit or vegetable?
People responded that they do not have idea.

How much can pay for a desidratador?
R. 10 people responded: it depends, they would have to see.

For consumers
have ever eaten dehydrated fruit or vegetable? Would they buy this
type of product?
10 people answered that they have not tried, and they would like to buy it.

What kind of quality do they want to keep the fruit or vegetable after dehydrated?
10 people responded that they do not know.

What kind of dehydrated fruit or vegetable have you been proven?
The 10 people responded: avocado, banana, nothing, and nothing.

What quality of dehydrated fruit or vegetables have you seen?
2 people responded: good and the rest of people responded that they did not know anything.

How hard to find it?
5 people responded: that is easy to find it, and 5 people responded that is hard to find it.

Where you can find dehydrated fruit or vegetable?
All the people responded: in the market.

How much are you be willing to pay for a dehydrated fruit or vegetable?
People said, depending on quality.
Name of Employee: Arturo Ujpán Mendoza

Self-grade 1-10 (best) each responsibilities, expected outcomes and addendum suggestions using FIELD COORDINATOR JOB DESCRIPTION. (Grade should be written on left side)

I. Main responsibilities:

1. Provide effective Communication

5 Constant phone access or calls returned within one hour
   (I used the cell phone for an effective communication with the students from Rafael Landivar University, for coordination of activities with groups of each prototype in Pasajquím, coordinating activities with the bricklayer, quoting prices in different hardware stores, with Paulina from IMI in relation to the wheelchair and others who were interested to modify the prototypes. I did not use the cell phone with anyone in the U.S., because for me it was more accessible to contact by e-mail every day with them)

8 E-mail response in < 24 hour preferable.
   (I always tried to answer e-mails every day and I even checked mails on Sundays by saving time for the other days, because I realized when I do this job it takes me from one to three hours daily)

2. Coordinate follow up to Y project with Landivar Professors Arce, Morales and their students

7 Minimum weekly (Bi-weekly, if required) visits to Pasajquím
   (I always went to Pasajquím two to three times a week and when I hurt my arm I did not traveled for a week).

5 Expedite Materials and tools delivery
(I only purchased materials of corn shellers and the improved stove, so then most of the prototypes already had the tools necessary to follow up the projects).

5 Research marketing opportunities
(The only prototype that needed a market was the corn sheller and I did this work by identifying the farmers who still have their corn on the field)

4 Support San Juan LL student’s participation in E/ME105
(calendar of turns to take biweekly classes, Landivar homestay families’ schedule, sharing after class sessions at San Juan
(At the beginning I coordinated the English classes for the San Juan students, because of the short time they took the classes they could not learned as much as Luzmy wanted. I coordinated with Saul (student from the URL) for the hosting of Estefana and me. Referents classes I always passed information to Estefana and most of the time we had a meeting after each class in San Juan).

3. Field coordination of project activities

8 Visit Pasajquím weekly (Bi-weekly, if required) participate in regular meetings with members of each project (depending on needs)
(I always traveled at least twice a week in Pasajquím coordinating activities, meetings and visits with each group)

7 Facilitate team interactions as appropriate
(In addition to the visits, meetings, training sessions with groups I always had communication with them by phone to inform me what is happening when they work alone.

8 Conduct training sessions as needed.
(I always was with the groups to guide and support them morally and financially).

4. Prepare and Distribute Bi-weekly Field Reports./ Final report

7 Summarize your activities every other week with each project, including accomplishments and issues to be resolved.
(I always wrote in my notebook my activities of daily and I have a leitz where there are copies of all those mails that Luzmi and other people wrote me regarding to the project, as well all the archives of Caltech since they arrived in Pasajquím until so far)

8 Write Final report summarizing your activities for each project, what you learned, what worked and what could be improved.

5. Keep all stakeholders informed of activities.

8 Caltech Coordinador (Luzmi Delgado) O Landivar (Oscar Arce and Ovidio Morales)

(I only talked with teachers from the URL when I was taking classes in the city and they never asked me anything of what was happening in Pasajquím).

7 Fundacion Solar Lester Alfaro, Monica Berger White
(I commented them what I was doing in the projects in Pasajquím and when I send the reports to Luzmi I copy them).

II. Expected Outcomes

5 Effective communications between local partners/participants and E/ME105 students
(I had a good communication with the students from the URL (Saul, Sophie, Gaby) but not with the Caltech students).

5 New ideas on making cross national teams more effective
(I could not participate with the students in team meetings for skype, because they used to do it late (22-24 hours) and the weekends, so the point is I study these days in Xela at the University).

5 Good documentation of activities and of project performance
(In the final report I tried to described well the results)

7 Well-motivated, active local partners
(Each time I participated in the meetings of the groups always encouraged moving forward, especially with the corn sheller group that had problems with the sale).

Addendum suggestions

• 7 Check e-mail on a daily basis and respond all mail within 24 hours. If you cannot be near a computer, perhaps someone else can help or use phone.
   (I always tried to answer e-mails and I even checked mails on Sunday by saving time for the other days, because I realized when I do this job it takes me from 1 to 3 hours daily)

• 6 Have phone charged and with enough credit at all times (use triple or quadruple minutes offer)
   (I always tried to have credit in the cell phone, but I more used it here with the groups to coordinate activities, with students from San Juan, with the group of beekeepers, with URL students and others involved in the project).

• 5 Keep record of needed materials: price, buy and delivery all incoming materials (Within Guatemala and/or shipped from the US)
   (I always did quotes and purchases with Adrian of the hardware store in Santa Clara)

• 5 Involve the eventual users on the design and operation of the different prototypes.
   (Each time I did the visits always involve the family, group or person who is in charge of the prototype, so in this way they would interest in the operation and later on they also are going to have this successful outcome).

• 4 Let people know about the function of each parts of each prototype.
   (During the visits, trainings, meetings and times we had with each group we always approved the operations of each prototype)
• 4 Train people in the use of the different prototypes. Guide people on the importance of testing prototype and giving candid comments.
  (With the visits and meetings that I had with the groups always spoke of the importance and purpose of each prototype)

• 7 Support people to be able to identify and solve problems that are typical in the operation and maintenance of each prototype. This very much includes ideas for better designs including, cost reduction, substitution of materials for local materials, better ways of using product, new product needs, etc.
  (Besides the trainings and instructions, I also asked other people to help me to solve the problems of the prototypes, such as the bricklayer with the problem of the stove, Ricardo with the problems of the Latrine and corn sheller, etc.)

• 6 Support market develop activities: more efficient production, improved financial returns
  (In the case of corn sheller, the problem was found in the market, but this project will improve in the harvest season in January and February).

• 6 When needed, consult with “local geniuses” Carlos Marroquin and Julio Cesar Coroy and or other technician or specialist in the field.
  (I always waited help from these people, but unfortunately the high cost charged by Julio Cesar could not come, and Carlos Marroquin was in the U.S.)

• 8 Ensure the legality of investments for project implementation in rented land (with support of Blanca Perez and Lester Alfaro, FS representatives in charge of gardens and contracts).
  (The Fundacion Solar always supported the legality of the land. And the support of investment towards the groups is in the process,
because the Fundacion Solar has to investigate the results obtained during the realization of the prototypes).

ANNEX 8:

ACTIVITIES OF MONTHLY REPORT DELIVERED TO THE FUNDACION SOLAR

<table>
<thead>
<tr>
<th>PROYECTO</th>
<th>PNUD</th>
</tr>
</thead>
<tbody>
<tr>
<td>RESPONSABLE</td>
<td>Arturo Ujpán Mendoza</td>
</tr>
<tr>
<td>COORDINADORA DE PROYECTO</td>
<td>Mónica Berger</td>
</tr>
<tr>
<td>PERIODO</td>
<td>1 al 31 Agosto de 2008</td>
</tr>
</tbody>
</table>

Principales actividades realizadas

✓ PROYECTO FUNDACION SOLAR–CALTECH

ESTUFA MEJORADA: El problema de la estufa es la chimenea y la puerta de enfrente lugares donde se escapa mucho humo. La persona que vendría a arreglar es Don Carlos Marroquín de Maya Pedal, pero él está en el extranjero y no podemos esperar más, dada la situación ahora estoy buscando a alguien local para que cambie de posición la chimenea.

SISTEMA DE IRRIGACION: Desde las instalaciones de la tubería en los dos grupos de huertos, han aprobado el funcionamiento del sistema y todo está bien. Este sistema se va a aprovechar más en verano. También el área del rotoplast instalado fue circulada con maya, porque la gente ya la estaba dañando con machete.

BICIMAQUINA: Enrique Morales está esperando a Carlos Marroquín de Maya Pedal que regrese del extranjero, para continuar con el proyecto.

LETRINA ABONERA: La familia Tuch García está usando la letrina todos los días. Ellos hacían preguntas sobre algún sustituto de la ceniza que ellos
aplican después de cada uso, entonces se les explicó sobre una fórmula de cal, brosa/hojarasca, tierra.

**DESGRANADOR DE MAÍZ:** El grupo está fabricando más desgranadores para ir a venderlo en el mercado de Santa Clara.

**SILLA DE RUEDA:** Joey estaba modificando la silla en Antigua en Transiciones

(Organización que diseñan sillas de rueda), después la mandaron otra vez en el centro Maya para gente discapacitada en San Juan para seguir aprobándola.

**OTRAS ACTIVIDADES:**
- Conferencia telefónica con los encargados de Caltech.
- Organización y participación de los estudiantes de San Juan, para las clases de inglés.
- Supervisión de los grupos para el seguimiento de cada prototipo.
- Elaboración de reportes.
- Leer y contestar correos electrónicos.
- Participación en reuniones con los grupos por cada prototipo.

**SAN MARCOS**

✓ Supervisión de siembra de café, se empezó a recorrer todos los terrenos que fueron sembrados por los socios, con los pilones entregados en los meses anteriores.

✓ Producción y comercialización agrícola, se está coordinando con Fedepma para la organización de un grupo de agricultores para la producción de diferentes hortalizas con el fin de abastecer los hoteles, restaurantes y comedores de la cuenca sur del lago.

✓ Reforestación: Entrega y siembra de árboles forestales a las diferentes
organizaciones: ex-pac, Asociación guatemalteca Pro-agua y saneamiento (AGUA) y socios de la Fundación. Nombre de los lugares sembrados: Chirijquej, chuisak’laq’, en los diferentes nacimientos de agua del municipio, Chuxé Sajkab y pequeñas parcelas alrededor del casco del municipio de San Marcos.

✓ Entrega de árboles chaluma a los socios, que servirá para la protección del café que se les está dando.

### Principales Resultados

- Se sembraron 7,750 árboles de diferentes especies para reforestación en diferentes partes de San Marcos la Laguna y coordinado con diferentes organizaciones.
- Venta de desgranadores de maíz en el mercado de Santa Clara.

### Principales Resultados Previstos y no alcanzados durante

- Supervisión de siembra de café.

**Firma del Consultor**
Arturo Ujpán Mendoza

**Firma Autorización de Pago**
Lester Alfaro

*Coordinadora Servicios Ambientales*
Mónica Berger

**INFORME DE ACTIVIDADES**

<table>
<thead>
<tr>
<th>PROYECTO</th>
<th>PNUD</th>
</tr>
</thead>
<tbody>
<tr>
<td>RESPONSABLE</td>
<td>Arturo Ujpán Mendoza</td>
</tr>
<tr>
<td>COORDINADORA DE PROYECTO</td>
<td>Mónica Berger</td>
</tr>
<tr>
<td>PERIODO</td>
<td>1 al 30 Septiembre de 2008</td>
</tr>
</tbody>
</table>
Principales actividades realizadas

✅ PROYECTO FUNDACION SOLAR-CALTECH
Del trabajo realizado en Pasajquím del 1 al 9 de Julio con los estudiantes de Caltech y Landivar, ahora se le está dando seguimiento para corregir y perfeccionar los diferentes prototipos: Letrina abonera, Bici maquina, desgranador de maíz, sistema de riego, estufa mejorada, y la silla de rueda que se diseñó en San Juan en el centro maya para gente discapacitada Xequiaqasiguán. Para esta actividad participaron 36 estudiantes (Caltech, URL Guatemala, y estudiantes de San Juan).
Otra de las actividades realizadas durante este mes fue la oorganización de los estudiantes de San Juan, para las clases de inglés.

ESTUFA MEJORADA:
Hablamos por teléfono con Luzmy que no se puede esperar tres meses a Carlos Marroquín (de Maya Pedal) para que él regrese de los Estados y me puse en contacto con Julio Cesar de TPS (tecnología para la salud) para que él fuera la persona quien se encargara de arreglar la estufa, pero este no pudo ser posible debido al alto costo que esta empresa cobraba. Entonces tengo que buscar una persona local, un albañil de ahí cerca de la aldea de Pasajquím para resolver este problema. Por el momento aunque la estufa esta con algunos problemas esta ha sido eficiente para la familia. Como se repite, el problema es siempre el humo que sale de la puerta delantera y de la base de la chimenea de la estufa. Bueno como doña Paulina no siempre usaba la estufa, así que ahora para definir y descubrir bien los principales problemas, la señora tiene que usar la estufa todo el tiempo.

SISTEMA DE IRRIGACION:
Grupo de Mujeres:
En esta temporada de lluvia el grupo no ha usado el sistema, pero si lo han aprobado, y con el problema de los fuertes aguaceros de ahora se
dieron cuenta que uno de los filtros estaba llena de tierra pero al limpiar esta parte este siguió funcionando. Desde la instalación del sistema hasta la fecha el grupo ha aprobado más de 4 veces y el sistema funciona bien.

Grupo de Hombres:
Desde la instalación del sistema hasta la fecha, el grupo también ha aprobado más de 4 veces el sistema funciona bien. Como se vuelve a repetir el área donde fue instalado el rotoplast fue circulado con maya para evitar ser dañado, porque se observó que la gente ya están dañando este equipo con machete y toda la tubería será enterrado para evitar incidentes.

Los grupos de mujeres y hombres han tenido siempre miedo de que extraños salten el cerco de los huertos comunitarios roben la cosecha y dañen el sistema de riego.

Por esta misma razón el grupo de los hombres necesitan maya o cerco en la parte norte del huerto que son 55 metros.

BICIMAQUINA:
En este proyecto Enrique Morales está esperando a Carlos Marroquín de Maya Pedal que regrese del extranjero, para continuar con el proyecto.

LETRINA ABONERA:
La familia Tuch García ha utilizado la letrina todos los días desde que los estudiantes de Caltech se fueron de la aldea. Cada mes la familia está colectando 4 a 5 galones (1 galón= 4litros) de orina. Hay ocho personas en la familia, cada persona utiliza la letrina 3 veces durante el día. La familia utiliza 2,5 libras de ceniza después de usar la letrina. Ellos tiran el papel higiénico en la letrina. Asimismo, tiran los restos de alimentos en la letrina. La familia mueve unas ves por mes el bulto de heces que se acumula en la cámara (base donde caen las heces).

Ahora la familia Tuch está aplicando la fórmula que se recomendó 1 / 4 de ceniza - cal + 1 /4 de viruta de madera finamente picado y seco,
materiales orgánicos, hojarasca + 2 / 4 de tierra. Ellos dicen que esta mezcla el material se prolonga más, porque anteriormente cuando ellos estaban aplicando sólo ceniza este se terminaba rápido en la casa.

**DESGRANADOR DE MAÍZ:**
Se obtuvieron ya los 2 tubos que Chris había pagado en la ferretería de Santa Clara, y también los tornillos que mandó Sophie de Guate.

Por lo tanto, el grupo comenzó de nuevo hacer más corn shellers, en este mes se sumó la cantidad de 70 corn shellers hechos. También el grupo siempre a intentado ir al mercado a vender el producto y este mes nada mas vendieron 7 corn shellers, pero se piensa vender el producto en los distintos mercados, como en San Juan, San Pedro la Laguna, Chichicastenango, etc.

Ahora cada vez que el grupo va al mercado el precio en que venden es de 3.00 a Q 5.00.

Un tubo de 6 metros de largo y 2 pulgadas de diámetro gastos de Q 75.00 c / u, y es el 75 Shellers maíz. Los tornillos que se utilizan ahora la medida es de ¾ pulgadas x 116 que cuestan 0.35 Q, y 225 son los tornillos necesarios para el maíz 75 Shellers de una tubería.

Yo organizé el grupo de mujeres para la venta del corn sheller en el mercado en diferentes días y fechas, pero las mujeres dijeron que se coordinara semanalmente de acuerdo a las necesidades personales de cada quién.

Después de esta poca venta que hemos tenido durante el mes, tuvimos una reunión con el grupo para consensuar cual era la mejor manera de vender el producto, porque salía más caro el transporte y la alimentación de las personas que viajaban al mercado que el producto vendido en ese día. El transporte de Pasajquíum a Santa Clara son Q 12.00 por persona, pero realmente en estos viajes van dos personas y el costo es de Q 24.00.

También en la semana del 8 al 12 de septiembre el grupo salió a vender de casa en casa en las aldeas vecinas. En Palestina vendieron tres de corn shellers, y en Panyeben no vendieron nada. Una de las señoras que tiene
su marido trabajando en Zunil, Quetzaltenango, un lugar de mucha agricultura, intentó ofrecer y vender el corr shellers y tampoco se pudo. Ahora yo trataré de vender aquí en San Juan con las personas que producen maíz. Otra cosa es que ahora no es la temporada del maíz, y según el ciclo del cultivo este aún está desarrollando en el campo. También es que la mayoría de personas en esta área tienen sus cosechas de maíz en Enero y Febrero.

Entonces creo que sería importante empezar a identificar las personas que tienen tierras con maíz en el sur de el lago y luego ir con ellos a ofrecer y luego a vender.

Bueno también ellas solicitan herramientas porque por el tipo de material que utiliza para la fabricación, ellas necesitan protección, entonces existen herramientas como: Mascaretas, gafas protectoras, guantes y otros que son necesarios para la seguridad. También necesitarán: tijeras de metal, taladro, sierras, martillos, clavos, desarmarmadores, lápices y otros para mejorar el diseño de fabricación.

**SILLA DE RUEDA:**

Yo entrevisté a las personas que aprobaron la silla de ruedas especialmente Delfina del Centro Maya, y estos son los comentarios:

- Delfina utilizó la silla, nada más en el área del Centro maya, porque ella sentía miedo de usarla afuera o en las calles porque la silla no estaba seguro.
- Delfina está acostumbrada a tomar su silla en un TUC-TUC (taxi), pero la silla de Caltech – IMI no podía ingresarla al tuc tuc porque estaba demasiado grande.
- Los neumáticos de la silla están desniveladas.
- El respaldo de la silla se dobla cuando la persona quien la usa pone todo el pesor.
- Delfina se cansa en usar esta silla porque es amplia y muy abierta.
- Una de las ventajas que las llantas tienen es que son anchas y fáciles de manejar en carreteras de mal estado.
• Los tubos que sirven de apoyo de los brazos no apoyan, de lo contrario estos lastiman a Delfina.
Bueno, finalmente Joey quien trabaja en una organización de Antigua que se llama Transiciones, y con Paulina de IMI recogieron la silla y se la llevaron en el taller para después modificarla tomando en cuenta los comentarios y algunas recomendaciones de Paulina.

OTRAS ACTIVIDADES:
- Conferencia telefónica con los encargados de Caltech.
- Organización y participación de los estudiantes de San Juan, para las clases de inglés.
- Supervisión de los grupos para el seguimiento de cada prototipo.
- Elaboración de reportes.
- Leer y contestar correos electrónicos.
- Participación en reuniones con los grupos por cada prototipo.
- Participación en las clases en la Universidad Rafael Landivar.
- Elaboración de encuestas de los diferentes grupos de estudiantes formados (Caltech y URL).
- Cotización de precios de los diferentes grupos de estudiantes formados (Caltech y URL).

SAN MARCOS

✓ Supervisión de siembra de café, se empezó a recorrer todos los terrenos que fueron sembrados por los socios, con los pilones entregados en los meses anteriores.
✓ Producción y comercialización agrícola, se está coordinando con Fedepma para la organización de un grupo de agricultores para la producción de diferentes hortalizas con el fin de abastecer los hoteles, restaurantes y comedores de la cuenca sur del lago.
✓ Reuniones con el grupo de agricultores con quienes se trabajará la producción agrícola orgánica.
Coordinación de venta de abono orgánico bocashi de los diferentes grupos formados.

Supervisión de áreas reforestadas.

Personas que hacían falta de recibir y sembrar árboles para reforestación y sombra de café.

Principales Resultados

- Venta de abono orgánico a personas extranjeras en San Marcos LL.
- Venta de desgranadores de maíz en el mercado de Santa Clara.

Principales Resultados Previstos y no alcanzados durante

- Supervisión de siembra de café.

INFORME DE ACTIVIDADES

<table>
<thead>
<tr>
<th>PROYECTO</th>
<th>PNUD</th>
</tr>
</thead>
<tbody>
<tr>
<td>RESPONSABLE</td>
<td>Arturo Ujpán Mendoza</td>
</tr>
<tr>
<td>COORDINADORA DE PROYECTO</td>
<td>Mónica Berger</td>
</tr>
<tr>
<td>PERIODO</td>
<td>1 al 31 Octubre de 2008</td>
</tr>
</tbody>
</table>

Principales actividades realizadas

PROYECTO FUNDACION SOLAR-CALTECH

Del trabajo realizado en Pasajquím del 1 al 9 de Julio con los estudiantes de Caltech y Landivar, ahora se le está dando seguimiento para corregir y perfeccionar los diferentes prototipos: Letrina abonera, Bici maquina, desgranador de maíz, sistema de riego, estufa mejorada, y la silla de rueda que se diseñó en San Juan en el centro maya para gente discapacitada Xequiaqasiguán. Para esta actividad participaron 36 estudiantes (Caltech, URL Guatemala, y estudiantes de San Juan).
ESTUFA MEJORADA:
Ahora la señora Paulina ha utilizado la estufa 2 meses seguido, en septiembre y octubre, al principio ella usó 4 leñas para 5 horas de cocina: maíz, café, frijoles y el recalentamiento de otros alimentos, pero ahora ella dice que usa 10-12 leñas cocinando todo el día. El albañil y yo intentamos solucionar los primeros problemas con la puerta de la estufa donde sale humo, también en la base del tubo de la chimenea. Ahora los problemas son los siguientes: la chimenea necesita un sombrero para proteger contra el agua porque esta misma agua de lluvia entra desde arriba y automáticamente baja en la parte interior causando daños ya en la base de la chimenea y en toda la plancha. También en la parte del borde de la Hornillas escapa humo.
Bueno los primeros problemas que tuvimos como sabemos son el humo procedente de la puerta y la chimenea de la estufa. Aquí buscamos la manera de resolver enderezando la puerta, también se le agregaron un par de ladrillos y cemento. Bueno este último trabajo no sirvió y hablamos de nuevo con el albañil y con doña Paulina, aquí discutimos sobre el cambio definitivo de la puerta de la estufa por completo, también que se modificaría el marco de la puerta con cemento y piezas de metal y también comprar un sombrero para cubrir la parte superior de la chimenea, sobre todo ahora que está lloviendo mucho, y también añadir más cemento en el borde de la hornillas para evitar que se escape el humo. Esta vez va a requerir un poquito más de tiempo y trabajo para fijar y modificar algunas partes de la estufa. Luego la señora Paulina puede utilizar sin tener que inhalar el humo, o causar daño a los visitantes, porque esta es la misma habitación que ella utiliza para dar recibir a su familia cuando tienen sus reuniones los fines de semana.

SISTEMA DE IRRIGACION:
Este mes no hubo actividad con este sistema. Los grupos están contentos con este proyecto porque esperan ahorrar tiempo y dinero cuando
empiecen a usarlo.

Grupo de Mujeres:
En esta temporada de lluvia el grupo no ha usado el sistema, pero si lo han aprobado, y con el problema de los fuertes aguaceros de ahora se dieron cuenta que uno de los filtros estaba llena de tierra pero al limpiar esta parte este siguió funcionando. Desde la instalación del sistema hasta la fecha el grupo ha aprobado más de 7 veces y el sistema funciona bien.

Grupo de Hombres:
Desde la instalación del sistema hasta la fecha, el grupo también ha aprobado más de 8 veces el sistema funciona bien. Como se vuelve a repetir el área donde fue instalado el rotoplast fue circulado con maya para evitar ser dañado, porque se observó que la gente ya están dañando este equipo con machete y toda la tubería será enterrado para evitar incidentes.

BICIMAQUINA:
Este proyecto sigue igual Enrique Morales siempre esperó a Carlos Marroquín de Maya Pedal para continuar con el trabajo.

LETRINA ABONERA:
Al principio mal olor se convirtió en un problema, pero ahora con la fórmula resultó mejor.
La familia Tuch García ha utilizado la letrina todos los días desde que los estudiantes de Caltech se fueron de la aldea. Cada mes la familia está colectando 4 a 5 galones (1 galón= 4litros) de orina. Hay ocho personas en la familia, cada persona utiliza la letrina 3 veces durante el día. La familia utiliza 2,5 libras de ceniza después de usar la letrina. Ellos tiran el papel higiénico en la letrina. Asimismo, tiran los restos de alimentos en la letrina. La familia mueve unas ves por mes el bulto de heces que se acumula en la cámara (base donde caen las heces).
Ahora la familia Tuch esta aplicando la fórmula que se recomendó 1 / 4 de ceniza - cal + 1 /4 de viruta de madera finamente picado y seco,
materiales orgánicos, hojarasca + 2 / 4 de tierra. Ellos dicen que esta mezcla el material se prolonga más, porque anteriormente cuando ellos estaban aplicando sólo ceniza este se terminaba rápido en la casa.

**DESGRANADOR DE MAÍZ:**
Este mes se sumó la cantidad de 102 corn shellers hechos. También el grupo siempre a intentado ir al mercado a vender el producto y este mes nada mas vendieron 10 corn shellers, pero se piensa vender el producto en los distintos mercados, como en San Juan, San Pedro la Laguna, Chichicastenango, etc.

Ahora cada vez que el grupo va al mercado el precio en que venden es de 3.00 a Q 5.00.

Un tubo de 6 metros de largo y 2 pulgadas de diámetro gastos de Q 75.00 c / u, y es el 75 Shellers maíz. Los tornillos que se utilizan ahora la medida es de ¾ pulgadas x 116 que cuestan 0,35 Q, y 225 son los tornillos necesarios para el maíz 75 Shellers de una tubería.

Yo organizé el grupo de mujeres para la venta del corn sheller en el mercado en diferentes días y fechas, pero las mujeres dijeron que se coordinara semanalmente de acuerdo a las necesidades personales de cada quién.

Después de esta poca venta que hemos tenido durante el mes, tuvimos una reunión con el grupo para consensuar cual era la mejor manera de vender el producto, porque salía más caro el transporte y la alimentación de las personas que viajaban al mercado que el producto vendido en ese día. El transporte de Pasajiquín a Santa Clara son Q 12.00 por persona, pero realmente en estos viajes van dos personas y el costo es de Q 24.00. También en la semana del 8 al 12 de septiembre el grupo salió a vender de casa en casa en las aldeas vecinas. En Palestina vendieron tres de corn shellers, y en Panyebar no vendieron nada. Una de las señoras que tiene su marido trabajando en Zunil, Quetzaltenango, un lugar de mucha agricultura, intentó ofrecer y vender el corn shellers y tampoco se pudo.

Ahora yo trataré de vender aquí en San Juan con las personas que
producen maíz. Otra cosa es que ahora no es la temporada del maíz, y según el ciclo del cultivo este aún está desarrollando en el campo. También es que la mayoría de personas en esta área tienen sus cosechas de maíz en Enero y Febrero.

Entonces creo que sería importante empezar a identificar las personas que tienen tierras con maíz en el sur de el lago y luego ir con ellos a ofrecer y luego a vender.

Bueno también ellas solicitan herramientas porque por el tipo de material que utiliza para la fabricación, ellas necesitan protección, entonces existen herramientas como: Mascaretas, gafas protectoras, guantes y otros que son necesarios para la seguridad. También necesitarán: tijeras de metal, taladro, sierras, martillos, clavos, desarmarmadores, lápices y otros para mejorar el diseño de fabricación.

SILLA DE RUEDA:
Este mes ya no pasó nada con este prototipo. Yo entrevisté a las personas que aprobaron la silla de ruedas especialmente Delfina del Centro Maya, y estos son los comentarios:
• Delfina utilizó la silla, nada más en el área del Centro maya, porque ella sentía miedo de usarla afuera o en las calles porque la silla no estaba seguro.
• Delfina está acostumbrada a tomar su silla en un TUC-TUC (taxi), pero la silla de Caltech – IMI no podía ingresarla al tuc tuc porque estaba demasiado grande.
• Los neumáticos de la silla están desniveladas.
• El respaldo de la silla se dobla cuando la persona quien la usa pone todo el pesor.
• Delfina se cansa en usar esta silla porque porque es amplia y muy abierta.
• Una de las ventajas que las llantas tienen es que son anchas y fáciles de manejar en carreteras de mal estado.
• Los tubos que sirven de apoyo de los brazos no apoyan, de lo contrario
estos lastiman a Delfina.

Bueno, finalmente Joey quien trabaja en una organización de Antigua que se llama Transiciones, y con Paulina de IMI recogieron la silla y se la llevaron en el taller para después modificarla tomando en cuenta los comentarios y algunas recomendaciones de Paulina.

OTRAS ACTIVIDADES:
- Conferencia telefónica con los encargados de Caltech.
- Organización y participación de los estudiantes de San Juan, para las clases de inglés.
- Supervisión de los grupos para el seguimiento de cada prototipo.
- Elaboración de reportes.
- Leer y contestar correos electrónicos.
- Participación en reuniones con los grupos por cada prototipo.
- Participación en las clases en la Universidad Rafael Landivar.
- Elaboración de encuestas de los diferentes grupos de estudiantes formados (Caltech y URL).
- Cotización de precios de los diferentes grupos de estudiantes formados (Caltech y URL).

SAN MARCOS

✔ Producción y comercialización agrícola, se compraron 95 sacos de abono orgánico Bocashi para la preparación de suelos, y para los diferentes grupos de Agricultores de San Juan, San Pablo y San Marcos con quienes se trabajará la producción orgánica.
✔ Reuniones con el grupo de agricultores con quienes se trabajará la producción agrícola orgánica.
✔ Coordinación de venta de abono orgánico bocashi de los diferentes grupos formados.
✔ Supervisión de áreas reforestadas.
✓ Supervisión de siembra de café, se empezó a recorrer todos los terrenos que fueron sembrados por los socios, con los pilones entregados en los meses anteriores.
✓ Taller agroforestal con encargados del PNUD y otras organizaciones invitadas.
✓ Siembra de hortalizas de Zucchini, Remolacha y frijol ejotero con el grupo de Producción Orgánica en esta comunidad.

### Principales Resultados

- Este mes se sumó la cantidad de 102 corn shellers hechos.
- Ahora la familia Tuch está aplicando la fórmula que se recomendó 1/4 de ceniza - cal + 1/4 de viruta de madera finamente picado y seco, materiales orgánicos, hojarasca + 2/4 de tierra. Ellos dicen que esta mezcla el material se prolonga más, porque anteriormente cuando ellos estaban aplicando sólo ceniza este se terminaba rápido en la casa.
- Venta de desgranadores de maíz en el mercado de Santa Clara.

### Principales Resultados Previstos y no alcanzados durante

- Supervisión de siembra de café.

Firma del Consultor
Arturo Ujpán Mendoza

Firma Autorización de Pago
Lester Alfaro

Coordinadora Servicios Ambientales
Mónica Berger
INFORME DE ACTIVIDADES

<table>
<thead>
<tr>
<th>PROYECTO</th>
<th>PNUD</th>
</tr>
</thead>
<tbody>
<tr>
<td>RESPONSABLE</td>
<td>Arturo Ujpán Mendoza</td>
</tr>
<tr>
<td>COORDINADORA DE PROYECTO</td>
<td>Mónica Berger</td>
</tr>
<tr>
<td>PERIODO</td>
<td>1 al 30 Noviembre de 2008</td>
</tr>
</tbody>
</table>

Principales actividades realizadas

✓ PROYECTO FUNDACION SOLAR-CALTECH

ESTUFA MEJORADA:

La estufa mejorada es uno de los prototipos que muchas personas en Pasajquím la quieren en su casa porque es una herramienta básica en la cocina y en el hogar de las familias. Ahora durante los meses de invierno, de noviembre a febrero doña Paulina dice que será para un doble propósito, tanto para la cocina y la calefacción. Las estufas mejoradas son buenas porque mantiene el calor después de haber sido utilizado. Doña Paulina ha estado utilizando la estufa durante los meses, septiembre, octubre y noviembre.

En el penúltimo trabajo que se realizó no fue suficiente el arreglo que se hizo, el cemento se cayó y se volvió a arreglar la puerta, el borde de las hornillas y toda la chimenea incluyendo el sombrero. Para este trabajo la señora Paulina tuvo que esperar una semana para que todo estuviera seco de nuevo. Ella acaba de comenzar a utilizar de nuevo el pasado domingo, 16 de noviembre.

Actualmente, la señora Paulina está utilizando la estufa sin tener que inhalar el humo o causar un daño a los visitantes.

SISTEMA DE IRRIGACION:

Ventajas de este sistema:

• Alto ahorro - entre el 40 y el 60% de agua con respecto a los sistemas tradicionales de riego;
• Reducción significativa en mano de obra – no sólo en la vigilancia del agua, sobre todo, por la menor incidencia de malezas en el cultivo;
• Gran ahorro en productos fitosanitarios y fertilizantes;
• Cabe destacar el aumento de la producción y rendimientos.

El grupo de hombres comenzó a utilizar el sistema hace 15 días, con comentarios positivos. 

Durante el verano, el sistema no se utiliza mucho, pero ahora que han empezado a usarlo. Ellos se turnan para regar los cultivos en el huerto y cada persona es responsable de una a dos horas utilizando el sistema a diario. Ellos usan el sistema de tres o cuatro veces por semana dependiendo del clima. Se nota que el trabajo es más eficiente y más rápido y esto significa que ahorrarán tiempo y dinero.

El propietario de la tierra del huerto de las mujeres ya no alquilará más el terreno. Por lo tanto, el sistema será trasladado a otro huerto en Panyebar.

**BICIMAQUINA:**

Con este proyecto siguió igual Enrique Morales siempre esperó a Carlos Marroquín de Maya Pedal para continuar con el trabajo.

**LETRINA ABONERA:**

Si bien en las ciudades la solución ideal es la construcción de los sistemas de plantas de tratamiento, en las zonas rurales con baja densidad de población, una solución más viable, técnica y económicamente, es la letrina. La letrina es una alternativa para la gestión de los residuos orgánicos producidos por los seres humanos. La letrina está compuesto también especialmente útil en las comunidades donde hay falta de agua.

Hay ocho personas en la familia utilizando, cada una utilizando la letrina una media de tres veces durante el día. Actualmente, la familia está utilizando una fórmula, de 4 de las cenizas / de lima 1 / 4 hojas secas + 2 / 4 del suelo cada vez que el uso de la letrina. La familia debe "depeak" se enfrenta a la reiterada una vez al mes para que no se forma una
montaña en un lugar en la sala de recogida.
La familia Tuch García ha utilizado la letrina todos los días desde que los estudiantes de Caltech se fueron de la aldea. Cada mes la familia está colectando 4 a 5 galones (1 galón = 4 litros) de orina. Hay ocho personas en la familia, cada persona utiliza la letrina 3 veces durante el día. La familia utiliza 2,5 libras de ceniza después de usar la letrina. Ellos tiran el papel higiénico en la letrina. Asimismo, tiran los restos de alimentos en la letrina. La familia mueve unas veces por mes el bulto de heces que se acumula en la cámara (base donde caen las heces).
Ahora la familia Tuch está aplicando la fórmula que se recomendó 1 / 4 de ceniza - cal + 1 / 4 de viruta de madera finamente picado y seco, materiales orgánicos, hojarasca + 2 / 4 de tierra. Ellos dicen que esta mezcla el material se prolonga más, porque anteriormente cuando ellos estaban aplicando sólo ceniza este se terminaba rápido en la casa.

DESGRANADOR DE MAÍZ:
Desde el principio, las señoras y yo hemos estado de mantenimiento los inventarios de los materiales, tanto de lo que hemos utilizado y lo que está disponible. También se registró el número de participantes en el desarrollo de la desgranadora de maíz. También se ha tomado la lista de personas que participan en las reuniones y capacitaciones. Ahora el libro está con Candelaria Cumpar.
El grupo está activo con seis personas. Ellos han estado trabajando tanto en la fabricación y venta del producto, pero han encontrado algunos problemas en el mercado.
Hasta el momento, el grupo ha tratado de vender el corn shellers 6 veces (5 veces en el mercado de Santa Clara y una vez en diferentes aldeas) en fechas diferentes en el mercado, y siempre hemos tenido problemas para venderlo. Ahora también tengo algunos corn shellers en diferentes tiendas de San Juan.

Número total de corn shellers vendidos: 28
Total de grupo efectivo:
10 de corn shellers X 5
7 corn shellers X Q 4
11 corn shellers X = Q 3
TOTAL DE EFECTIVO = Q 111.00

El sábado, 8 de noviembre, Sophie una estudiante de la Universidad Rafael Landivar vino a demostrar cómo se puede vender el producto en el mercado de Santa Clara o en cualquier mercado, y dice que la falta de experiencia, el deseo y la colaboración del grupo es la razón porque el corn sheller no se vende.

SILLA DE RUEDA:
Este mes ya no pasó nada con este prototipo. Yo entrevisté a las personas que aprobaron la silla de ruedas especialmente Delfina del Centro Maya, y estos son los comentarios:
• Delfina utilizó la silla, nada más en el área del Centro maya, porque ella sentía miedo de usarla afuera o en las calles porque la silla no estaba seguro.
• Delfina está acostumbrada a tomar su silla en un TUC-TUC (taxi), pero la silla de Caltech – IMI no podía ingresarla al tuc tuc porque estaba demasiado grande.
• Los neumáticos de la silla están desniveladas.
• El respaldo de la silla se dobla cuando la persona quien la usa pone todo el pesor.
• Delfina se cansa en usar esta silla porque es amplia y muy abierta.
• Una de las ventajas que las llantas tienen es que son anchas y fáciles de manejar en carreteras de mal estado.
• Los tubos que sirven de apoyo de los brazos no apoyan, de lo contrario estos lastiman a Delfina.
Bueno, finalmente Joey quien trabaja en una organización de Antigua que se llama Transiciones, y con Paulina de IMI recogieron la silla y se la llevaron en el taller para después modificarla tomando en cuenta los comentarios y algunas recomendaciones de Paulina.

**OTRAS ACTIVIDADES:**
- Conferencia telefónica con los encargados de Caltech.
- Organización y participación de los estudiantes de San Juan, para las clases de inglés.
- Supervisión de los grupos para el seguimiento de cada prototipo.
- Elaboración de reportes.
- Leer y contestar correos electrónicos.
- Participación en reuniones con los grupos por cada prototipo.
- Participación en las clases en la Universidad Rafael Landívar.
- Elaboración de encuestas de los diferentes grupos de estudiantes formados (Caltech y URL).
- Cotización de precios de los diferentes grupos de estudiantes formados (Caltech y URL).
- Elaboración del informe final.

**SAN MARCOS**

- Producción y comercialización agrícola, Siembra de hortalizas de Zucchini, Remolacha y frijol ejotero con el grupo de Producción Orgánica en esta comunidad.
- Reuniones con el grupo de agricultores con quienes se trabajará la producción agrícola orgánica.
- Coordinación de venta de abono orgánico bocashi de los diferentes grupos formados.
- Supervisión de siembra de café, se recorrieron todos los terrenos que fueron sembrados por los socios, con los pilones entregados en los meses anteriores.
**Principales Resultados**

- Actualmente, la señora Paulina está utilizando la estufa sin tener que inhalar el humo o causar un daño a los visitantes.

- Siembra de diferentes tipos de hortalizas.

---

**Principales Resultados Previstos y no alcanzados durante**

- Venta de desgranadores de maíz.

---

**Firma del Consultor**

Arturo Ujpán Mendoza

**Firma Autorización de Pago**

Lester Alfaro

**Coordinadora Servicios Ambientales**

Mónica Berger