

**Draft**

**ADPP-FACT Narrative Progress report No. 5**

**1<sup>th</sup> of July 2009**

**Jatropha oil for local development**

**in Mozambique**

**Biofuel for Development and Communal Energy Self-Supply**



*Kids and Jatropha plant*

**July – 2009**

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## Abbreviations:

BBC	Bilibiza Bio-fuel Center
CD	Cabo Delgado
DI	Development Instructor (a volunteer assisting in ADPP projects)
DPA	Provincial Department of Agriculture
EPF	Escola de Professores do Futuro - Teacher Training College
EW	Extension Workers
FC	Farmers Club
FCC	Farmers Club Committee
FEW	Field Extension Worker
HQ	Head Quarters of ADPP in Maputo
IIAM	Instituto de Investigação Agrária de Mozambique. Agricultural Research Institute conducting research on jatropha cultivation issues.
ME	Ministry of Energy
PL	Project Leader
PPO	Pure Plant Oil
PT	Project Technicians (one water technician and one jatropha technician)
QNP	Quirimbas National Park
SSCD	Sustainable Supply Chain Development (Company led by Ruaraidh Petre in Botswana)
TT	Teacher Trainee - implementing community mobilising in rural communities during teaching practice period of 11 months
USDA	United States Department of Agriculture (co-funder)

# 1 Introduction

The main objective of the 'Jatropha oil for local development in Mozambique' project is to improve the self supply of energy of community members in the Quirimbas National Park (QNP), Cabo Delgado (CD), Mozambique and in doing so, assist their income situation. Currently, farmers within the national park are isolated from many services, are subject to severe difficulties in farming due to conflict with the parks wildlife and have few income generating opportunities. Not much is known about viable cultivation of Jatropha cultivation in Mozambique, but the climate and soil in the project area appears well suited to its growth. Additionally, its low maintenance characteristics lend itself as an easy alternative source for energy for local subsistence farmers without compromising their primary need to produce food crops.

The project has entered its second stage of the project which is aiming at establishing a Pure Plant Oil (PPO) production unit, named Bilibiza Biofuel Center (BBC) for pressing and purifying the jatropha seeds.

This report overviews the progress of activities outlined for the period November 2008 to July 2009, and provides a reassessment of the activity timetable based on practical judgements from the field.

## 2 Progress per expected main result

### 2.1 Expected main results at end of project

Twenty five Mozambican rural communities will produce jatropha seeds sustainably for energy use on at least 250 ha.

#### What is going well?

- Total number of FC producing Jatropha now is 36 (june 2009) surpassed the target of 25 with 11
- At present some 250000 jatropha plants are growing, the equivalent of 250 ha. The project target has been reached!! (compared to 95 ha in Nov 2008)
- Farmers are collecting seeds to sell to BBC for pressing, but it was agreed that Farmers Clubs (FC's) have to collect first 1 ton before the truck will come to collect. Unfortunately the truck has been worn out (within 2 years!)
- Combination of food and fuel, especially vegetables, with Jatropha is working well.
- Good stories can be told; many FC have sold quite good last year, like Metambo for USD 800 of vegetables. In total over 2 tons of Jatropha has been bought for 5 MTN/kg. This price is too high and will be reduced to 2.5 MTN/kg after 2010.
- The quality of wells and steel pumps has improved, for 22 FC wells plus pumps working well (14 FC in Nov 2008) the well plus pump are in order, although it seems that water scarcity is increasing.
- At Escola de Professores do Futuro - Teacher Training College (EPF) school in Bilibiza the nursery is doing well, the agricultural school is learning from it, and some students of the Agricultural school also work in the FC projects now.
- The demo plantation at EPF school has been established, although the size is somewhat smaller than planned, since the seedlings were needed for the FC's.

- The BBC workshop is being equipped, now that 2 presses and a generator set parts have arrived, under guidance of Francisco Dias
- Project staff has been strengthened. Francisco has been trained in Tanzania with Diligent in use and maintenance of the Sayari oil press. Both Francisco and Bachir were trained in Tanzania at SHIPO in affordable technologies, like wells, tanks and hand rope pumps, and in business development as well.
- Attention from the Government is good, after the first lady visited EPF in 2008, this year National Director of Renewable Energy, Mr. Antonio Saide has visited the project in CD and he was very enthusiastic. He wants to support the project and thus engage the Ministry with the project.

## **Activity 2: Regarding market development**

During the mission of Flemming Nielsen in April, it was found out that farmers have little opportunity for income generation. Therefore they are willing to pay any (low ) price for jatropha seeds, which is increasing the possibility of developing a successful PPO business. During the mission of Jan de Jongh in June, a terms of reference was developed for a business development plan for the BBC and several persons were contacted and consulted about their views and possibilities to execute part of the study. ADPP headquarters is taking this very seriously and has committed themselves already by guaranteeing salaries of the 2 main project leaders up to 2012. One important question is for example, if the Farmers Clubs should be share holders in the company or not. All market possibilities should be studied, not only PPO , but also soap, etc.

Presently, there is no Jatropha oil being produced in Moz.

Evretz in Chimoio, is pressing cotton seed and uses the cake for fodder of its cattle and neutralizes the cotton oil into edible oil. Some years ago, they have used it also to make biodiesel which was blended 50% with fossil diesel and the tractor run on it for a year without problems. There are sales ongoing in seeds and in seedlings.

The development of a modification kit for the diesel engines has been stalled.

The modified diesel engine, make Feidong (copy of Lister Petter) is undergoing a 500 hrs on PPO (of cotton oil) by Brendon Evans of Evretz farm in Chimoio. It has made only less than 100 hours up till now, since the Feidong was connected to a waterpump, which had the wrong capacity for the load, pumping from the lake. A new second hand pump was bought from a leaving Zimbabwean farmer and it will be connected so that pumping can start again. So the endurance test can continue.

Taken one sample of the edible cotton oil to the Netherlands to have it tested in a laboratory on Phosfor, Acid nr, etc. (4 important variables for using in cars replacing diesel)

## **Activity 3: Regarding ongoing research**

Some important findings:

Some cases of total destruction of full grown Jatropha plants by ants have been found.

No natural pesticide has been found yet;

The life cycle information of the most aggressive yellow flee beetle is not known yet and should be further studied, in order to develop remedies.

The trial plots have been established for about half of the plots, for yield measurements of various varieties;

The trial hedges of various shapes and plant forms, seedlings, cuttings and direct seeding have been established as well.

The project team is collecting the seeds from the plants in separate envelopes each month.

#### **Activity 4 dissemination of experiences**

A first draft video film was made by the DI Tiago, for further editing, but it had not been sent yet to the project up to now.

GTZ-ProBEC has printed an amount of nice colour leaflets with proceedings of the fourth seminar on exchange of experiences between various organisations in Mozambique 7-8 Nov in Chimoio. Individual presentations of participants have been placed on FACT's website.

Bachir Afonso participated in a number of meetings organized by WWF, both in Maputo as in Nairobi, and the project got quite good attention.

#### **Activity 5 additional proposals**

A short contact meeting between Mr. Filipe Sampaio, from ABIODES project leader of the EU funded project in which FC's produce trees, besides producing food crops for food security reasons (from SSDC of Rory Petre), and Jacob Zulu, head of all Farmers Clubs projects in Mozambique and Morgen Chira, PLO of Sofala project was held. It was the intention that ADPP Bilibiza will be the partner for Cabo Delgado while FACT could give technical advice and could monitor experiences.

Attempts to make extension project proposals under Biomass Mondiaal and Daey Ouwens funds were stopped, since they did not seem feasible.

#### **Activity 6: Acquiring necessary equipment**

The Toyota Hiace truck is been worn out and needs to be renewed.

A new motorbike for Francisco has not been bought yet

Computers often break down and there is no back up system, needs to be installed.

#### **Activity 7 Extension to other provinces: Sofala, Nampula and Macuse**

*reported by Jacob Zulu and Morgen Chira, in Beira & Dondo*

##### In Sofala,

Project Leader (PL) Morgen Chira

They are active in the district Vunduzi in 10 villages where 10 FC's have been formed. In this district there are in total ca 8000 farmers. These 10 FC's with total 500 farmers have planted 11.000 jatropha plants of which 10.000 survived. (planted in Nov 2008)

The farmers were only motivated to plant hedges of Jatropha, no price for the seeds was discussed. 1 Extension worker lives in Gorongosa and 1 supervisor.

Project office with Morgen in Dondo, since they have two more areas with FCs without Jatropha there.

Activities in 2008 were intended to send one extensionist of each province to Bilibiza. Instead one extensionist from Bilibiza came to the provinces to train. Augusto went to Sofala and Macuse and Asuba went to Itoculo.

In Vunduzi there is no cattle (so no good chances for biogas) No fertilizer is used, very poor area, see survey obtained from Morgen.

Vunduzi is very close to Environtrade, where they have 4 ha and a 6YL 80 Double Elephant press received from the Govt. Since the Govt Ministry of Energy (ME) wants very much to

support the project in Gorongosa, supported by ProBEC, it would be good to link our project with them, A good option could be to make an agreement with Environtrade to use their press, so our project does not need to buy a press (the prices have gone up much and we will surpass the budget, since we need three presses).

The plan for 2009 is:

To execute the energy demand survey, similar to the one done in Itoculo in 2006.

To expand the Jatropha production

Send one project person to Bilibiza for the Jatropha cultivation training course in Sept. There will come some people from Gorongosa as well, so contacts can be laid there as well.

### Itoculo, Nampula

PL Else Marie Fogtmann

They have planted two times, but only 4000 plants survived.

First time planted in rainy season in Dec 2008, but after a short while a drought period came and plants died. Thereupon second time seeds were planted.

Plan for 2009 is to plant 50 kg of seed. This amount still needs to be send from Bilibiza or elsewhere.

### Macuse

PL Luciano

The area where the FC's are developed in Mocuba, since in Macuse the area is prone to water logging. In Mocuba there are 10 FC's with Jatropha plants 12000 are growing, planted in January 2009.

### **Activity 8: Developing the training center**

The building to host the pump production workshop and the oil producing unit BBC is practically completed. Electric wiring need to be renewed , because capacity was too low. Also the improvement of guest rooms for training participants are practically finished. Ready to host the first participants for the training course in September.

The Sayari oil press and the diesel gen set bought in Dar es Salaam, finally arrived in June 2009 in Bilibiza, and are being installed. The press bought in Maputo has arrived much quicker, but costs are high. A 16 x 6 m shed is being build for storage of sacks with jatropha.



*The practically completed building, with a separate generator house*



*The storage shed being build, just opposite the workshop building.*

### **What is going not so well?**

- In general the agricultural part of the project is going very well, the direct project staff in the field is very strong, but it also means that practically all efforts are going into this part and the other main activities get less attention. That has also been caused because of too little support from ADPP staff. It is a challenge for the project team to focus now more on market development and business plan and running the first training course.
- Transport remains a big problem, The second hand bought Toyota Hiace truck, has been broken down within two years. The costs on transport are much higher than budgetted.
- Obtaining of major equipment for the Jatropha oil producing workshop (BBC), oil press and generator set from Tanzania has delayed the oil pressing over one half year.
- The intended cooperation with IIAM in Sussundenga for research in jatropha appeared to be so disappointing that cooperation with IIAM has been stopped. Flemming Nielsen continues to cooperate with experts and students from Eduardo Mondlane University.
- Assistance by Christian Fenger of GAIA movement also became less intensive, since Christian has an assignment in Mexico and is not visiting Africa anymore.

### **Solutions recommended**

- The project has been expanded with one year, to end 2010.
- Full focus should be given, with support of (remaining ) uncommitted project funds by FACT, to develop the BBC in a viable business and on developing modification kits for the diesel engines and train sufficient mechanics to be able to convert the engines, even after the project has stopped.
- To buy a good second hand Mitsubishi 4 tons truck direct from Japan.
- Christian will concentrate on editing a film of the project and on translating part of the jatropha handbook into Portuguese and making manuals for the training courses.

### **Challenges**

- To overcome traditional agriculture of shifting cultivation, using slash & burn
- Short project periode
- Finding good people for rural areas

### **Challenges of market development**

- To keep the farmers producing jatropha even at a lower price
- To develop a profitable BBC
- To produce PPO at sufficient quality level, using RK2000 standard for rape seed PPO, to be used in diesel engines.
- To develop other products and introduce these in the market, eg compost from press cake, soap, lamp oil.
- To find out if the farmers can themselves produce oil, by small diesel operated presses (design imported from FACT Honduras project) and produce soap and lamp oil from it.

See Presentation Market aspects of JdJ during Seminar in Chimoio from 7-8 Nov. 2008

- The question arises how to introduce the PPO in the market, since over 2 years, end of the project, probably not enough jatropha seed and thus PPO to run all 20 diesel engines and cars modified. Two strategies could be followed, either by blending with diesel and providing all 20 + modified diesel engines, or use 100% PPO on a few selected modified engines only, eg at EPF Bilibiza.

- Due to short period of the project within the provinces of the extension part to other provinces very little jatropha seeds and oil will be available, in 2010. Therefore the most realistic strategy is to concentrate on oil production and introduce soap making and producing oil for lamps. Experiences from the leading project in Bilibiza which is ahead, will make it clear if the other provinces have the required conditions to start also producing PPO for diesel fuel, after the project has ended.

### **3 Field visits**

#### **General:**

Up to today 36 FC's are producing Jatropha plants which is 11 more than the project target of 25. showing that the project team is able to make the Farmers enthusiast about it.

The project team is keeping track of the number of plants that actually are growing . They are counted by the extension workers.

#### **Field visits June 2009**

##### **Jan de Jongh**

On Friday 19<sup>th</sup> of June, visits to 25 de Julio, open well at road point between 25 de Julio and Ntessa, Maguide, Petolia, 1o de Maio, Massasse and Metambo.

With water team Bachir, driving, Serafim and Semaio, plus Janio Jaramillo (DI from Colombia, age 55!)

On Tuesday 23 June visit to Pemba Metuge, market along road, plus clubs of Nicuita and Nacude .

#### **25 de Setembro;**

Visited a small school that had planted some jatropha's as well. No water and recently 2 latrines were built by The Grupo de Aqua y Saniamento , concrete slab, plus holes of 2,5 m. Houses of reed around still to be build. Slabs funded by Arrakis.

Met with the head teacher. Number of children: 100 1- 5<sup>th</sup> grade, 2 teachers, Building (6x3 m.)very poor, thatched roof. New roof would costs 10.000 MTN for zinc plates plus 15.000 for labour. (total ca USD 900).

The FC of 25 de Setembro nearby, just started preparing the field, Head was a women, had some nurseries with just seeds coming up. Hand dug well, starting collapsing, steel plates from manila's been put as as reinforcement. Sufficient manilha's present. The water team will line out the well soon and place a hand rope pump.

#### **Open well.**

Serves for 3 villages, Ntessa, 25 de Setembro and another one.

Water nearly finished! and still 6 months before rain will start. There is a Afridev pump in Ntessa, but that gives salt water. From a hydrological map, available at Agha Khan, it became clear that a large area from Quirimbas Park, bordering the sea the water is saline and not recommended by the Govt to make furo's. Maps and drilling logs an be obtained from National water department. DNA in Maputo.

With the low alluvial layer of soil, between a few meter to 12 m in some cases, and a hard rock bottom underneath, the content of water (from rain) in these aluvial soils is limited and seems to be less each year. The FC members of Petolio said that last year the well was dry in Sept. but tis year they expect it to be dry in August. This is an alarming situation, "Sim aqua no futuro!" for nobody and no project!

Based on an extensive field research done by Janio, the expectations are that the river Montepuez will be totally dry in three years from now.

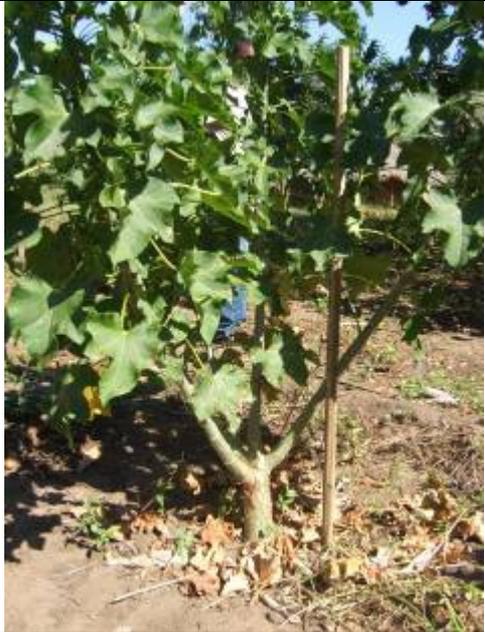
Saline tube wells with Afridev's sofar found are in Ntessa and Petolia.

le de Maio s ok.

The water team had the intention to build a mall dam in the small gully before the well. But when following the course of the well and determining the gullies margins it became clear that there is hardly a water flow in last years . (the complete water flow goes through a circular hole under the road of 1 m diameter. The water team decided to start a dam at another place, namely Nicuita.

### **Maguide**

Here a farm trial plot as established by Henderson. The Jatropha's planted in Jan 2009 from seedlings from the EPF nursery did extremely well. Over 2 m, giving seeds already! The demo field of 60x 30 m was fine. Pumps are used a lot, and pistons were quite worn out, after ca half a year. Need to be replaced. Some of the FC's know how to make new pistons and have received punches as well.

	
<p><i>One of the mans height Jatropha plants of the trial fiel, established by Henderson. Note the red ribbon at the bottom</i></p>	<p><i>The plants produced already seeds after one half year!</i></p>

### **Petolia**

Hand pump ok. Well depth 4,50 m to cover, present waterlevel was 0,90 m measured.

Long discussions with the members. They need pesticides and transport to bring products to the market )in villages Last year they have not sold anything because of pests. More then 10 farmers have maize in store tat they want to sell. (present price according Bachir is 3 MTN) Example is Margarita Musa, She works only with her husband on total 4 ha of land.

She has two stores, 1 for own use and one for selling ( which practice was advised by the project team) She has about 1 ton of maize for sale, loose not in sacks, and some 4 sacks of sorghum.

She does not have sacks, so it was offered to her that she would sell brown beans to Bachir, for the EPF school. After weighing of 4 sacks the total she sold was 150 kg. From that money she could buy sack for the maize.

Bachir bought the beans for 10 MT/kg, she asked only 6 MTN. In general all farmers are selling too early in the season when prices are low and also for a too low price. The project team is advising them to keep the products longer and only sell when prices are high. The local head of DPA, Victorio Amimo mentioned that they wanted to restart the radio program where by they are sending SMS messages to people in the field with mobile phones with the present day prices of the various products. This could help a lot for the farmers to obtain a good price (experience in other countries JdJ) Upon leave, the group asked Bachir to buy seeds of onions and other vegetables in Pemba for them, since they now had money!



### **1o e Maio**

First we visited the field of the Chefe de FC, Mr. Amisse Calemane.

He had planted 2875 jatropa plants around his field of ca 4 ha. Plants ca 2 years old.

They were large and in general healthy, apart from a few that were eaten at the roots by ants, destroying the plant totally. This hedge was also visited by the minister of RE Mr. A. Saide, who was very impressed. Inside the field was casave, which is momentarily being harvested everywhere.

At his house, Amisse also showed his storage room, where he had about 2 sacks of Jatropa estimated some 40 kg. They have been asked by the Project team to collect from all farmers until they have one ton all together, and then it will be collected by truck.



*One plant fully destroyed by ants*



*Part of the hedge of over 2800 plants*



*Amisse with one of the sacks with Jatropha*



*The fallen leaves of the jatropha's, give a good ground cover to keep moist*

### **Masasse**

The club was doing great, Large production of vegetables at the demo-plot, which was also extended since November. The well and pump were well installed now. Pistons already worn out of intensive use. Last year they sold from the demo field for USD 700

### **Metambo**

Same story. Last year sold USD 800.  
Water column was 1,30 upon arrival.

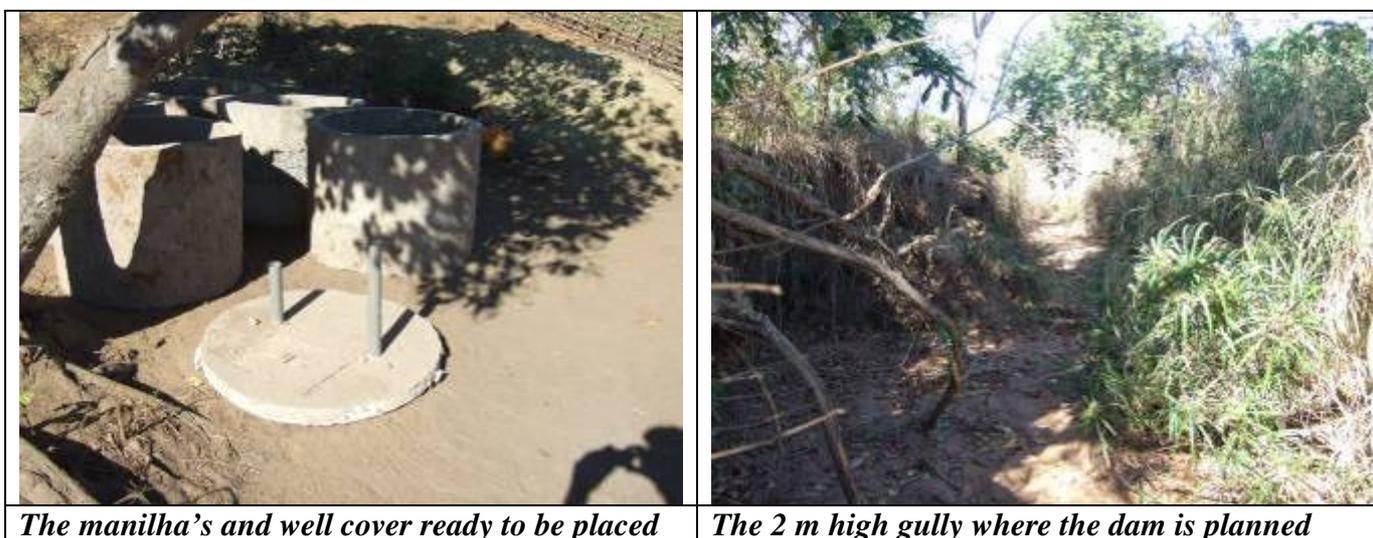
There are no illness in the cabbages, etc. The farmers themselves know 2 different natural plants that acts as pesticide, when leaves are bruised and mixed in water, after which water is sprayed on the plants.



### Visits on Tuesday 22 June

Pemba Metuge Nicuita and Nacua

**In Nicuita** , on three spots a hand dug well was made, at 6, and 7 m depth, but encountered rock at the bottom and no water. The third well is now 6 m deep, encountered water and this well will be made deeper. There are already 6 manilha's ready. Very close by is a deep gully with steep slopes over 2 m deep. Bachir had a meeting with the starting up FC committee and asked them how and when are we going to solve this problem. They came to the solution to build a dam for water harvesting from the rain, and the project should help to buy bags for them to put sand in. From tomorrow they are going to have meeting with all club members and community leaders , so that they can start the following week. Simao of the water team will guide them. JdJ agreed, the target is to give FC's secure water points, not only lined out wells with good pumps. If there is no water security, there is also no food security!



### 23 d June 2009, Nacua

One head of FC of Nacuta , Jose Nerani came by bicycle from his club near Pemba Metuge, 120 km driving on a sandy road with a large back of cove of 45 kg. to sell to the EPF school. They bought it for 10 MTN/kg , so he got nearly EURO 12 for the bag, which is far too low. He should have get 16 MTN per kg, according Bachir.

He was very angry at he EPF school teachers who were shouting to him that his price was too high, while Bachir had asked the farmers a time ago to deliver now and than to EPF, since the school students were only eating beans and needed vegetables. This is not really the way to motivate farmers and getting better food for the EPF students.

He has sold from his own land this year 23000 MTN from horticulture, from April-June. They have water enough, a lined out well plus a hand rope pump., so he can produce until December. The most products he is selling to other schools and Pemba metuge government district office

The bike is the one bike given by FACT project for each FC.

We offered him a room of the Training Center, ad the next day we dropped him at his house and saw his place.

He had planted 18 shrubs of Jatropha around his house , nearly 2 years old, and more than 2 m high (even after pruning). He had a sack of 20 kg harvested since May, so on average each plant gives more than 1 kg, which is equivalent to more than 1 ton /ha.

The soil is rather fertile, sand mixed with clay. The pump rope was removed, the pistons were worn out and he tried himself to make new ones and could not do it., but the water team had planned to come this day to repair it. It was one of the first steel pumps installed in Aug. 2007, and it needs improvement in several points.

If there are more farmers like him, the small farmers will really going to make a difference and they deserve our full support!



*Jose has just arrived at EPF, after 120 km peddling.*



*Kids plus Jatropha bush, in front of his house*

#### **4 Table 2: planned results versus actual results and variations explained.**

The spreadsheet is apart, and needs to be inserted later on, after comments have been received



## 5 Conclusions

All major components of the project to develop a local market of diesel engines running on PPO of Jatropha are starting to come together now;

- The agricultural part with the farmers clubs is still doing very well. 36 clubs in total have Jatropha plants growing now and seeds are being collected. Practically all clubs had generated some income from the vegetables and jatropha sold. The planting target of 250 ha equivalent (or 250.000 living plants) has been achieved!!
- An experienced leader for the Bilibiza Bio-fuel Center (BBC) has received various training courses and is building up the Center.
- The Workshop building for the Processing of the PPO, containing the equipment as oil presses, etc and also for production of the pumps is nearly finished.
- Most of the equipment is present , but needs to be installed.
- The diesel engine duration test with modification to be tested in Chimoio has been halted, but will start soon.
- Most farmers have collected jatropha, but they need to bring 1 ton per club on one collecting point before it will be bought by the project. Presently no truck is available.
- Research trial plots, both on hedges and fields have been established and seeds are collected in a systematic way. Research on making natural pesticides and biological behaviour of yellow fleabeetle and ants in relation to jatropha still needs to be started.

Water and elephants remains a problem in the area, requiring more training of farmers and investigation into solutions. Also theft is a problem in some areas.