

FACT Project Mozambique; Mission report June-July 2010,

Jan de Jongh

Progress at the project base, Bilibiza



Progress in oil pressing, collecting of seeds, refining of the oil is going very slow.

Major reason was that the leader of the BBC workshop , who was trained at Diligent, disappeared for 2-3 months (family problems). A new man from Humana from Zimbabwe Nyasha was attracted. So, training him has to be started again. He has funding to stay for three years minimally.

1 drum of pressed oil, about half full

Price paid to the farmers for Jatropha is 5 and some 2.5 MTN/kg

FC project will continue for 2 years paid with a project from AECID (Human Spain)

So, Both Henderson and Bachir will be paid from that.

Nyasha will stay the next 3 years.

Biggest problem at present mentioned by the team is Soap making which is not really going well, soap stays soft.

A mail was send to Kakute: kakute@tz2000.com, Reinhard Henning, FACT , Titus Galema, and Janske van Eijck.

Monday 3 July, first soap with low amount of water and high soda was made;

80gram soda: 100 ml water: 0,5 l jatropha oil (with acidity nr 13,5, measured at ASG Germany)

Team meeting with Henderson, Bachir, Nyasha was made, major points discussed:

- Technical leader of the BBC workshop to be fired??;
- Nyasha to follow up all the points related to the BBC
- A number of progress reports and other reports need to be made; like: water status, wells and pumps; hours run with cooking oil of Generator, nr of plants in FC's (around 600.000 now!!)

Major points to be tackled in the 2 weeks:

1. Make hard soap (stated Monday) After one trial with less water (mix: 80 gram Soda, 100 ml water; 0,5 l oil) the soap was already quite hard after one night.
2. Try to make peanut butter with 2 elephant press (Tuesday) Succeeded! Only collecting the press cake, with no oil pressing, the peanut butter is practically ready.
3. Neutralize acid in Jatropha oil, method Brendon (started first Test on Monday 5) 68 gram soda: 625 ml water: 5 l oil. Half hour stirring above fire, let stand one night. (ratio's acidity nr (13.5) x nr liters = 68. Amount of water ca 10 times more. (Brendon: 1:10:80)
4. Tuesday 6, 2d Test" 41 gram soda; 625 ml water; 5 l oil. Partly fluid, with foam because oil was cooking (should not be) To repeat.
5. Tune double elephant press to be able to press jatropha, first with the e-,motor
6. Make two connectable platforms, one for diesel and one for press for multifunctional units at 2 locations in clusters of FC's. Mount one set and try out transport plus mounting and pressing. There is no pulley on the available Chinese diesel engine.
7. Modify the diesel of Maize mill at EPF, and start endurance test of 500 hrs on PPO, and Niels to train at the same time ca 5 mechanics (also maize mill owners-mechanics)
8. Buy enough PPO for the Gen set to run in total 500 hrs. Only after quality of Jatropha oil is known it can be decided to buy either cooking oil (80 MT/liter) or use jatropha PPO. Henderson bought 500 l of cooking oil on Wednesday.
9. Teach titration to determine acidity
10. Improve workshop, 7.5 kW e-motor will be mounted next Thursday

Inputs from Erik Schurmann & Jacob Zulu

Preparation for Technical Team activities in July.

The maize mill house belongs to EPF Hassira, director, and the Feidong diesel belongs to Agricultural school, with Abel as director. He has given permission to modify the Feidong.

Financial audited report 2009, Anne Fisker

A preliminary report was obtained from Anne in 2 July Maputo.

It showed that the expenditures over 2009, were approx 16.000 Euro less than in preliminary report.

Propose to make a new Budget 2010 Rev E. (include business plan writing in it, instead of extra addendum). E.g one press less to buy (for Itoculo) use for motor maintenance (was too little). 3 of the 4 larger ones need repairs, (ca 7-8000 each). *This plan has now been changed, since ADPP has just approved the buying of 4 new motorbikes from the AECID budget; this means extension staff will have a reliable transportation within two weeks. The motorbikes are big enough to be used in transporting jatropa from clubs which are difficult to reach otherwise.*

The money shall then be used to maintain the Nissan Double cab which is in bad shape, as a result of driving in harsh conditions in the area. The car shall go for a full service in Nampula, where good car parts can be obtained and reliable workshops can be found. This is to make it fit for driving to Maputo after modifying its engine in September, where the next seminar has been proposed to take place. It shall be driven on PPO from BBC and partly from Evans in Chimoio and used as a demonstration to the participants of the Maputo seminar.

The budget for Itoculo can be reduced , for salary and that can be added to Macuse.

Set backs:

Transport:

The truck cannot reach everywhere, since after the heavy rains, the roads became very bad and the truck is not a 4 Wd. It can only reach the FC's along the road.

So, solutions have to be found. Possible, *when the new big motorbikes of the Extensionists have been bought (from funds from a new project of AECID, building dams in rivers where the FACT farmers clubs are located as well, they can bring a sack each time to a collection point. New collection points will be made that are reachable for the truck. Farmers can also bring them on bikes.*

Market distortion;

Seed price: Since large buyers from Tanzania came and were buying seeds for 30 MTN. it is more difficult now to offer only 2.5 Mtn /kg to the farmers, They start negotiating about the price. So, market distortion has occurred already, after discovery of the seeds here.

Staff

The technical man who was attracted for leading the BBC workshop, did not perform as expected. Due to family circumstances, he disappeared for 3 months in total. Apart from that he achieved to press the first 100 l of jatropha oil in December with the Sayari press, but the workshops had not been improved, and showed nearly the same as when we left in October 2009.

The tools and machinery were not in order, only 1 hammer left, only one vice mounted of the 2, table not strong enough etc. Welding equipment in poor shape. The radiator belt of the gen set was nearly broken.

It was mutually decided to give him a last chance; he can prove that he can work for next 3 month and then a decision need to be taken, to continue or to fire him.

A new PL was attracted, Nyasha, who was assigned to take the lead of the BBC to develop it as a running business.

At the end of the mission, upon debriefing at ADPP in Maputo, it was decided to attract a more experienced person to develop the BBC business in the coming half year. Shortly after Itai Chikanya (from Zimbabwe, former PL in Niassa farmers clubs) , with business development experience was found as the available person to join the team in short time.

Water team:

The 2 best people left, Serafim, the pump installer, back again to Itoculo, and .. left ADPP to join another organization. Nacir, the pump producer is still there, as well as 2 extension workers Assuba and Augusto . *Insa is on management training in Zimbabwe. The other three extension workers are quite new.*

General status of development of BBC .

The jatropha plants in the FC's seem to be ok. After intensive count of all the living plants by the extension workers, they came up with a number of 600.000 plants in total!! Which is impressive in view of the goal of 250.000.

Regarding the BBC workshop:

Since Niels and I left in Oct, not much had been done at the BBC. Only Sayari press had been operated and with it about 100 l oil was pressed and cleaned by bag filters. With a full production target of 100 l/day!! This is thus quite low for an 8 month period. Nothing else was done yet, no soap, no peanut butter, no other oils pressed. Workshop and tools in poor state, very little jatropha in stock, only ca 1,6 ton.

Motorbikes in bad state, Nissan bad maintenance etc.

It seemed as if the BBC project had been neglected.

Water technology workshop

Workshop equipment in poor condition, tools missing, only 1 hammer around, grinder not installed, grinder cutter with bad disks, etc

Some 30 pump handles and wheels in stock. Plus bushings. The “new” pistons I saw at the workshop, made by Augusto were terribly bad condition and not much better than worn out ones. Bachir as PL for water has to pay more attention to the quality of the water products.

Market surveys and market development

The planned market survey had been carried out by Jacob, with help of Henderson and Bachir in Cabo Delgado and the PL’s in the other 3 provinces, and gave good information for the business plan to be made.

Soap., lamps, peanut butter, PPO

Documentation, publicity etc.

A film has been made by local television. (AND broadcasted on the national TV.to buy this film)

Business plan

ADPP does not want to go for a loan at this stage. The risk are estimated too high regarding paying back There are still too many unknowns in the whole business.

However it will be good to prepare already a business splan, with good spreadsheet (nearly ready now) that can be used to set targets and determine preliminary prices for the seeds to be paid to the farmers and price of oil to be sold. Targets for pressing, etc.

Regarding making the FC’s share holder of the BBC (like BYSA did in Gota Verde) was not a good idea in this phase of development according to Erik S.

First the 1800 farmers are wide spread, many without telephone or no telephone reach at all. This will give communication and logistic problems. Then there are at present 16 FC’s legally registered (10 last year), but they really do not function much as an organization. Most of them cannot read or write.

Danger of letting farmers holding share of the BBC can now be foreseen, the BBC will not make much profit the first years, or loss. Then no profit can be shared with the Farmers. Since some of the most active farmers are also active with the local politicians, they will complain with those politicians that this firm BBC, run by Danish NGO is not sharing their profit with them. That might have severe consequences, firing back on ADPP, and the results will be negative instead of positive.

Major Activity 7 :expansion to provinces: Reported by Jacob Zulu

Itoculo. Large problems with jatropa, happened three times already that after planting and seeds germinated, they died, either by drought or flooding. Combination of soil and climate conditions are not good for jatropa in Itoculo. Since no plants are left, it was mutually agreed to stop with Jatropa in Itoculo.

Macuse/Macuba: about 4000 plants are doing well At the end of this year they will have seeds to be pressed. However, the Macuse FC project will stop this year Zeca out of work, and no one is going to continue with the jatropa .

Sofala Gorongoza, Because of drought from dec 2009-jan 2010) happened just after sowing, most jatropa plants died, New plants have been planted in Febr 2010 and are growing now, height ca 0,5 m. It will take another 2 years before seeds can be harvested. Since there is a press at Gorongoza, with Environtrade, which they can borrow, there is no need for a press from the project.

The FC program ending this year, expects new funding for coming years.

Field trip on Wednesday, seed collection and FC demo plot inspection of pumps and wells.

With the truck Jan went with Zacaria and Bachir for seed collection. People from Citate had given info , by mouth and by mail, that they had 0,5 ton in stock, plus neighbours with enough seeds to reach 1 ton.

Upon arrival, first took half an hr to find the persons of the FC. The truck could not go up to small road leading to the FC;'s plots, which the Nissan could do. Then it took another half an hour to find the person with the key of the store room. About 7 people of the FC were present who had jatropa in sacks in the store. Two people could not come, they were in hospital (one with astma, the other with dearhea). Then their scale was stuck, so someone had to borrow (had to pay for it as well) a scale from a small shop nearby. After weighing al the sacks, the total amount was 155 kg. This was paid to all sellers, cash at hand for 5 MTN /kg (the agreed program price). Some of the farmers could not write nor read, so the president had to sign for them.

Then moving to FC 1o de Maio to inspect the demo garden and pumps, the present president knew that in a neighbour village of Citate, people had Jatropa. So, since we were already in the neighbourhood, we went there and gradually some people came with some more sacks. Same procedures done and another 80 kg was added. At a third spot some more kg were added, arriving at a total of ca 300 kg. The trip took ca 8 hours in total. It is clear that this way of operating is far too costly.

Trials

Visited trial plots in Muaguide, coloured rings were removed *two weeks after tying but other indicators were observed e.g stones etc.* Plants tall (up to 3 m now). Seeds have been collected each month and put in envelopes. They are being stored in the office at the BBC workshop (since Flemming left , in March 2010) *The person in charge of collecting seeds from the trials is strictly followed up to ensure that*

he does not miss a date, he collects all the seeds which are ready on the trees, and that envelopes are clearly marked and stored in a good place.

Not so many plants have died from the trial plots, and up to the present moment it is only the hedge improvement trial in Ngeue which is completely inexistent.

Also at trials at EPF bands were enlarged, plants large and well, and seeds collected.

Pests

Around the EPF school, on some of the plants with jatropha seeds , green plus yellow many colorful rainbow shield bugs were found.



Pruning.

Most plants need pruning at hip height. (2d time), or at shoulder height (3 time). *The project has good experience pruning in early September. It is felt that pruning in September does not coincide with horticultural activities, but gives the same result as mid-year pruning (May-July).*

Weeding:

Two weeding actions have been recorded in 2010, as follows

DATE (S)	AREA COVERED	# OF MEN	LENGTH OF TIME	AMOUNT PAID	OBSERVATIONS
12-13 February 2010	16853 m ²	6	16 hours (9hrs first day and 7hrs the second day)	3200 mt	Field too weedy (grassy), following the rains
22 June 2010	16853 m ²	4	9 hrs	1200mt	Field lightly weedy following the first weeding and reduction in rainfall.

The first weeding could be done earlier in January to facilitate harvesting, but it coincides with planting of food crops.

Water

All FC's have hand rope pumps and improved wells by now. When something breaks (e.g bushing) *they contribute an agreed amount of money and come to buy a new one at the BBC workshop, at a reduced value of 40mt per bush.*

Upon arrival water level was quite high, in 1^o de Maio, some of the demo field too much water for planting even. In Muagide within the well, the water level was at about 3 m.

First club visited, 25 De Setembro, women were taking water with buckets from the well. Because in the season from febr – july they live in their fields, instead of in the village, while the demo plots of the FC's are in the village. Therefore they remove the pump during that period and keep it in their house. When they move to the village again. They put the pump up again. There are 4 trained mechanics in the region now from the FC. Who can install the pumps themselves. They can make pistons themselves. The next demo fields of Metambo, Masasi, 1^o de Maio, Muaguide, the pumps were all installed and working. Still some quality improvements could be made, regarding oiling bushes, fixing wooden legs, water pits, etc.

Three of the 6 extension workers; Insa (who is on management training in Zimbabwe) Assuba, and Augusto have been taught to install rope pumps. The other three cannot install properly because they are quite new, as such, the training should be arranged for them.

Just after the demo field in Metambo, a large flush over dam is being build at this moment in the running AECID project of ADPP, where 24 dams will be build to retain the water in the area. The dam has a length of approx 15 m, height 2 m and with 1 m, of concrete with big boulders, smaller stones and reinforced bars plus cement. One team of about 30 people was building it (there is another team working building a similar dam at another place (project 4,5million Meticaís)



Obtaining good quality PPO

In Dec first oil was pressed with Sayari press and oil cleaned.

Test sample tested at ASG in Germany in May showed very poor quality, acidity of 13.5 (while 2 is allowed according DIN 560000)

Therefore, It was decided not to use the jatropha oil for the modified diesel for the generator set, for the time being.

The idea was to use the same method of Neutralization Brendon Evans had used to Neutralize his cotton oil and apply it on the Jatropha oil, so that the quality becomes acceptable as PPO fuel for the diesel engines, according NEN norm 560000 (see FACT jatropha handbook)

Neutralizing the Jatropha oil.

After Jan was trained at Ingenia to do titration, Ingenia had sent the titration stuff to Niels who took it to Bilibiza. Jan de Jongh started to measure acidity of the Jatropha oil available and trained the BBC staff, Henderson + Nyasha.

A number of tests were done, resulting in getting g the acidity down from 19,5 to 2.5. The oil had a clearer look by then and changed to light yellow greenish. It was also more translucent. However only about 1.5 l clean oil and 1 l of liquid soap (flocks)



Left Acidity 7; right acidity 2,5

Conclusion: the method can be followed and further developed by trial and error, but the start acidity nr should not be too high, say lower than 10. Quite some soap, which is not usable, is formed, causing further loss of neat oil. Better to prevent the cause of getting a high acidity nr.

To check the general assumption that green plucked seeds have high acidity, a small research will be done, by sending plucked seeds, green, yellow and black to ASG and let them analyse on acidity only.

Mushroom smell of seeds in sacks in store and sacks collected from farmers., According Niels, this smell in rapeseed, causes very bad quality oil. To test a sample.

Soap

It proved to be impossible for the staff to make soap by themselves, although all manuals were available.

Jan did the first test first day and halved the prescribed amount of water. With the recipe of 80 gram caustic soda KOH, 100 ml water and 0.5 l jatropha oil (acidity 19.5) the soap was hard in one night.

After that some 16 more trials with various different recipes were done. Observation report plus marketing plan will be made by Nyasha.

Conclusion, it is well possible to make good soap for a reasonable price that can compete with the better washing soaps on the market 20 MTN/piece off 100 gram (in coloured printed paper wraps).

The jatropha soap cannot compete with lowest cost brown bars of soap.



Jatropha soap (second from bottom) and local available soaps.

Peanut butter

First peanut butter made by Jan using double elephant press to press it, gave crunchy peanut butter with good taste.



Recepee , 20 kg shelled peanut butter was bought, (500 MTN)

Put in water with 0,5 kg of salt for a time;

Than roast the peanuts and peel off the shells;

Than press it, while no oil is coming out, only use the cake, which can readily be bottled as peanut butter.,

Some extra vegetable oil could be added to make it less dry.

Conclusion:

Peanut butter easy to make and probably a good product for the region

Lamps

Jan made a number of lamps with the local tin-smith and started to try them out, but not so succesfull yet. More designs and trials need to be made.

Someone had tried a mix of parafine and jatropha oil 50/50 which seemed to work better. However, after a while the 2 different oils (in spec. gravity) will separate, and the same problem will occur.



Modification of Feidong diesel engine of Maize mill plus training

Modification Feidong of EPF Moageira + training & mecanis by Niels

The Feidong diesel engines (robust Lister copies), are water cooled, but not provided with thermostats, causing that the temp of the engine does not exceed 52 degrees (unloaded).

Niels first mounted a thermostat in the Feidong of the Gen set, and later during the modification of the Maiza mill Feidong as well. The result was that after mounting of the thermostat the temperature became 20 degrees higher, up to 72 degrees!

This engine to be run on cooking oil as an endurance test. Niels gave the datalogger to be mounted to Technical leader of the BBC workshop.



PRESES:



Technical leader of the BBC workshop succeeded to run the Sayari press (for which he had been trained at Diligent in Tanzania). However, since there was no motor yet, he borrowed the 5.5 kW motor from the 2 E press.

Upon arrival we moved the 5.5 motor back to the 2E press, leaving the Sayari press alone and concentrated on getting the 2E press running. (A new 7.5 kW emotor has been ordered and will be installed soon)

This because the 2E press seems to be more professionally made, especially the worm, which is machined, in contrary to the Sayari worm which has been grinded off. Therefore, we want to get the 2E press run with jatropha, while the Sayari could be used for pressing edible oils and peanuts.

Starting up the double elephant (2E) press 6YL-80

Since in October the press had clogged , Technical leader of the BBC workshop had grinded of parts of the screw and ruined the 2 end parts (conical). So, the parts were taken of, by heating first in a fire, and last 2 replaced by the spare ones we had.

1 st trial, seeds were too dry, press clogged quickly, but feeding of seeds was done too quickly (found out later). Seeds were crashed first by hand and then dried in the sun, 3/4 day. And amount of evaporated water estimated at 3.4 % , but next day, again half day in the sun, more water had evaporated.

2 d trail seeds were first mixed with water to achieve about 6 % moist.

When feeding in very slowly, the press did not clog and gave good cake plus oil, but mixed trough each other. That was caused by wrong position and sequence of rings, since we had no proper manual from the supplier. Fortunately the supplier answered our questions about it and did send proper drawings back.



Thereupon the rings were positioned correct.

Wednesday 14 :After first press, again clogged (too dry seeds, too fast?)

After clearing again, and moistering the seeds pressed again, in begin good, oil came out some liter and cake, but later on clogged again.

Conclusions for operating of the 2E press:

1. The seeds MUST have a proper moisture content of ca 6%, otherwise the press clogs.

2. The starting up of the press must be done very slowly, until the press is getting hot. Handfuls of seeds need to be filled in slowly, without filling the bunker up from the start

Improving sedimentation and purifying set up

The final full production target is ca 100 liter of pure PPO/day (after plants mature after 5-7 years, but for the moment the system (for 1 press) will be designed for ca 50 liter clean PPO/day.

Niels designed a collection-sedimentation tank, which was fabricated Wednesday+thursday.



Step 1: The pressed oil will flow by gravity in the first compartment of the tank, than the heavier parts will sediment and the cleaner oil will overflow at the top to the next largest compartment, where the oil will further sediment and the clean oil will overflow to the last 3d compartment.

Step 2: The rather clean oil of the 3d compartment will be pumped with the pump and hose from the plate filter and fed through the plate filter. I.e if the capacity of the plate filter is big enough.



Otherwise, the oil needs to be pumped in barrels that can be sealed of (from air) and let alone to sediment for 1 week. (these tanks are not there yet, and need to be foreseen of conical shaped bottoms, with 2 to 3" valves at the bottom, to drain of the sediments).

Step 3: The rather clean oil needs to be finally cleaned by pumping through a candle filter system (can be delivered by Niels)

Step 4: The final clean oil needs to be pumped in a storage cubicle with filling system (pistol with counter plus hose). (cubicle to be bought , and pistol plus hose plus counter can be delivered by Niels)

Step 5: The clan PPO can be pumped in 20 liter or larger tanks for users.

Preparation part: A mechanical sieve (driven by e-motor) , with mess somewhat smaller than the jatropha seeds, to get sand and small stones out, still needs to be bought and installed (probably in Nampula)

Act 5: Developing large proposals:

Janio is preparing Seminar in Pemba from 10-11 August " Without water, no future"

Administration & plan: Made new FACT-ADPP budget Rev E together with Henderson.

Plan is to concentrate on BBC and QNP only, and reduce activities in 2 other provinces, skipping buying two presses. Instead, make budget available for an experienced expat, who can come to develop the

BBC over the coming half year., Two times about 1 month. Persons like Titus Galema, or Mauricio Gnecco, or Raghavan.

It is of no use to buy presses for the provinces, if we cannot get the BBC started and prove that it can really work.

Therefore, also the team in Bilibiza will be strengthened by an experienced man, Namely ITAI CHIKANYA (originally from Zimbabwe, former PL in Niassa, who has business skills.

He will try to develop the BBC in line with the business plan for the coming months until the end of the program, to prove that it is possible.

Also concentrate training centre on BBC alone. In Chimoio, Brendon does not perform well, and EPF nor farmers clubs have staff oriented to these subjects. In Itoculo, Jatropha does not grow at all and in Macuse FC program stops as well.

Therefore: Plan: 2d Jatropha cultivation course at BBC from 20 Sept-1 Oct 2010. Plus technical course from 4 – 9 Oct .

Then final presentation of the project with lessons learned will be held in Maputo instead of Chimoio (better chance on attendance of Government and large NGO's representatives)

With publicity stunt that the Nissan, after conversion, drives on PPO from Bilibiza, via Chimoio, tanking PPO fro Cotton oil at Brendons place, to Maputo and back.

ANNEX Test with Neutralization of oil

See Note...on Cotton oil.

1. Neutralize acid in Jatropha oil, method Brendon (started first Test on Monday 5) 68 gram soda: 625 ml water: 5 l oil. Half hour stirring above fire, let stand one night. The ASG report from the same oil, taken in March by Flemming had send to ASG gave an Acidity nr of 13.4. It was assumed that the same ratio was still valid, but later that proved not to be the case, it had increased up to 19.5 . Found out after titration

The amount of KOH to be added, according titration manual is Acidity nr (13.5) x 1 gram/liter of oil = 13.5x5lr =68 gram.

Taking the amount of water ca 10 times more. (brendon: ratio soda: water:oil=1:10:80)

The result was that the whole amount f liquid had become a soft soap in flocks, no liquid left.

See picture

2. Tuesday 6, 2d Test" 41 gram soda; 625 ml water; 5 l oil. Result: Partly fluid, with foam because oil was cooking (should not be) To repeat.
3. Test 3 : Same test was repeated and oil not cooked. Result oil on top , not so clear. Titration showed acidity 7.,
4. Test 4: Now the acidity number of 19.,5 was taken as the basis;

Added: $19.5 \times 0,6 \times 2.5$ liter (oil) = 29.3 gram soda

312 ml water

2,5 l oil

Result: oil on top quite clear; Acidy measured only 2.5!! (Tuesday 13) Colour changed to light yellow greenish. More translucent. However only about 1.5 l clean oil and 1 l of liquid soap (flocks)

Conclusion: the method can be followed and further developed by trial and error, but the start acidity nr should not be too high, say lower than 10. Quite some soap , which is not usable , is formed, causing further loss of neat oil. Better to prevent the cause of getting a high acidity nr.

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