

Jatropha Agronomy and Plant Breeding at LIRE

Report for SES and LIRE about my 2nd LIRE visit from January 19 to February 14, 2008

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The **Lao Institute for Renewable Energy (LIRE)** is a non-profit institute operating in Vientiane, Lao PRD. LIRE explores, develops and sustains efforts for making Laos develop its own energy sector with own renewable sources of energy, at energy prices that are commercially viable and affordable to most of the Lao people. LIRE is operated by a trust, whose members are Lao institutions from government, non-profit organizations and companies. At LIRE presently work 12 people, about 25% of which are graduate students from abroad. Part of the technical workload of LIRE is also being done by Sunlabob (one of the LIRE founders, located at the same place). LIRE grows *Jatropha* as energy crop in cooperation with village farmers at many different locations since the dry season of 2007. The reason of my second visit was to strengthen agronomy and plant breeding of *Jatropha* at LIRE. There is a high demand for genetic and agronomic improvement of *J.* as it was never really adapted to the conditions in Lao PDR.

Changes in between my two visits

LIRE has meanwhile improved its manpower. The managing director now is a M.Sc. in Energy and Environmental Technology. Also new are a Head of Administrative Unit and an Agronomic Expert. All three positions are held by German experts, which made the cooperation and development of new projects very easy. I had the impression that the intercultural and innovative relations within LIRE as well as the coop with Sunlabob has yet improved, although it was already on top level during my first visit.

Jatropha Agronomy and Plant Breeding

This was my 2nd visit within 9 months. The following fields and *Jatropha* plantings were visited:

1. Lao State Fuel plantings
2. Kampong's field
3. Military field north of Vientiane
4. Setting up a nursery for new selection experiments
5. New fields, to be selected for new *J.* plantings

Experiment 1 is a propagation experiment from the state owned fuel company (Fig.1). They are looking at the ways of how to produce oil and bio diesel from *J.* In Lao PDR fuel is highly subsidized, all of it being imported from Vietnam and Thailand. One litre of gasoline costs around 1,10US\$ and diesel about 1US\$. *J.* was planted about 18 months ago after pregermination of seeds in a covered and protected nursery in plastic bags and afterwards transplanted to the field at a spacing of 2x2m. The *Jatropha* plants were pruned to a short level and made a comparatively good impression. Young seedlings were about to be planted. One employee of LIRE is a consultant to Lao State Fuel. For LIRE this connection is very important for keeping track of the most important user and distributor of fuels.

At Kampong's field the elite plants from last year's visit were selected. During this new visit the bulk plants obviously were still in a dormant stage without any fresh leaves (Fig.2), waiting for some kind of trigger either by stress or water. For checking this, a small experiment was conducted with pruning and additional water supply. The outcome could already be observed at the end of my visit, when the pruning method showed the desired effect of bud formation (Fig.3 and 4). This means, that considerable additional growth would be obtained and that assimilate formation will also work during the dry season. For a better understanding of this an experimental approach was designed, to

cut down a statistical no. of plants once at each of the following months until August 2008. Monitoring and yield data will have to be taken to understand the effects of pruning.

The visit of the **military field** was somewhat disappointing, as after the harvest of the intercropped upland rice no weeding or other care of the left J. plants was done (Fig.5). This is typical for developing countries and new markets. The J. market is not really working, as crushing of seeds and further processing of the oil has not been practiced at an optimum scale. Farming and harvesting therefore will not be done in a proper manner, unless the market develops.

In one of the many fruitful meetings with the LIRE crew I was informed that the J. experiments in the remote villages have not been monitored for a long time because of missing funding. Certainly that kind of feedback is not the optimum way of treating the villagers.

The **nursery** (Fig. 6 to 8) is located at the Dongkhamxang Agriculture Technical School (DATS college), where one LIRE academic employee lives and teaches classes for students in agriculture and livestock. Traditionally J. is pregerminated in sand beds for 14days, transplanted to plastic bags and after about 1month the bags will be transplanted to the field. This procedure is somewhat laborious, however the traditional Lao method of choice. We were discussing to at least try a direct seeding in bags. Due to some misunderstanding, this procedure was done in the old tradition, which later turned out to be the better approach! We were performing the sand bed sowing and organized the filling of bags for about 4600 plants. These are mainly the elite plants, selected during my first visit plus 19new elites, selected at Kampong's field and from different natural J. progenies in Northern Lao. From these elite progenies 50 to 150 single plants will be propagated at one or at all three new breeding fields. We did first monitorings (Fig. 9 to 11) and discussed the design of the 3 fields as well as the layout of the breeder's book.

New fields were selected at locations close to LIRE, less than 15Minutes drive. For the desired agronomic and plant breeding experiment it certainly makes sense to have locations closer to the offices. Especially during the rainy season, this would reduce the workload drastically. These new fields certainly will cost some extra money for LIRE to rent the land, in the long run, however, this should pay off. The following locations will be planted in 2008: Beer Lao field (Fig.12; close to the brewing company), College field (DATS, Fig.13), and a smaller field in downtown Vientiane, this one especially to show to visitors. Within the next four weeks the rental agreements will need to be signed and the fields will also have to be prepared. Soil preparation is a very tricky part of the LIRE work, as there is no real farm crew within the team. Most important: there exist no own farm tools like tractor, plough, combine harvester, thresher, seed cleaner, seed dryer, etc. So all this will have to be rented and paid for or the work be done in a laborious hand-mode.

Other Business

We also did crushing of 800kg J. seeds (Fig 14 and 15) with an old oil mill rented from a local company (Mr. Kamsing). The oil is being sold to a German company for generating extra funding to LIRE. The company will utilize J. oil for research purposes.

A similar money generating approach was taken with a well known German J. research company interested in the breeding lines of LIRE. Several mails and treaties were formulated and exchanged in order to reach a common agreement and an optimum price for germplasm seed and cuttings (Fig.16). The German partner is comparatively tough and does not seem to have the proper understanding of how money funding should be established in a developing country.

A research proposal of 150.000€on J. planting, crushing and energy generating demonstration project on village scale was written and coordinated with the sponsoring agency.

These are all common means, LIRE of course has to do in order to get hold of more funding, support and interest within Lao and the J. community. That way hopefully some of the constraints and limitations mentioned may be overcome.

During my visit I received an invitation to give a presentation on J. breeding at this year's Narossa meeting in Magdeburg. I accepted and replied that the presentation be given together with the two LIRE experts.

Recommendation

LIRE should report on the progress of the breeding and agronomy work on a regular base. The selection process should be finished by Nov. 2008 and the selected new seeds be ready for planting. I could assist during that time in narrowing down the genetic variation.



Figure 1: Jatropha at Lao State Fuel field. The plants are about 2 years old. They were pruned in December.



Figure 2 to 4: *J.* at Kampong's field.

Top: *J.* elite plant in a dormant stage (no leaves!).

Middle: 2 weeks after cutting experiment...

Down: ...buds appear



Figure 5: Jatropha with intercropped upland rice at Military field. The rice was harvested, but the interest in Jatropha soon was forgotten.



Figure 6 to 8: Jatropha nursery close to college field. Preparing the plastic bags (top) for about 4600 plants, the seeds of which were pregerminated in sand beds (down).



Figure 9 to 11: Thomas Pircher monitors the *Jatropha* nursery 7days after sowing.



Figure 12 to 13: new land had to be selected and measured (top: Pome and Thonglai at Beer Lao field). Jakob Rietzler, the author and Adby at the College field.

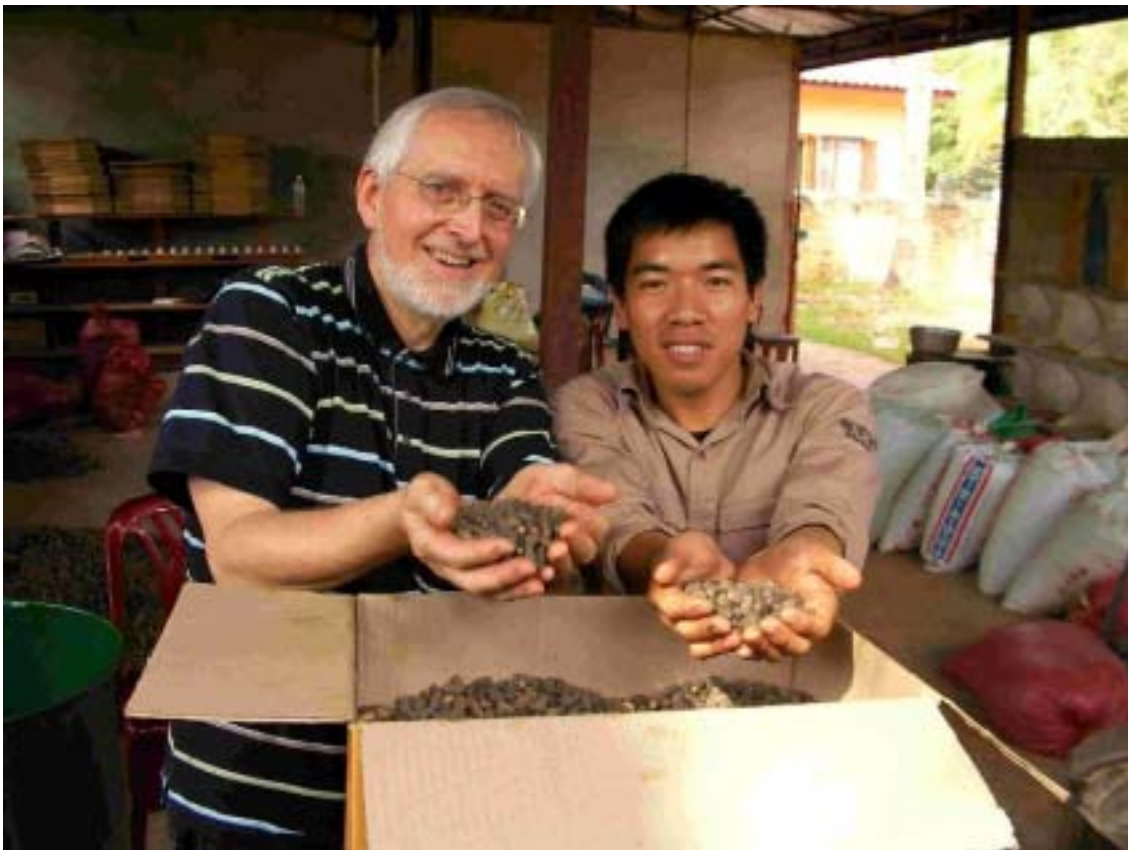


Figure 14 to 15: seed crushing with Thonglai



Figure 16: Pomé, Thonglai and Thomas Pircher after a hard day of work taking Jatropha cuttings at Kamphong's field for shipping.