



Jatropha curcas L. of the Euphorbiaceae family

PROJECT COORDINATOR



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The JatroMed Project

Evaluation of the energy crop Jatropha curcas L. as a mean to promote renewable and sustainable energy for the Mediterranean region

(www.jatromed.aua.gr)

The JatroMed project is a 4-year demonstration project involving five countries from the Mediterranean region: Greece (project coordinator), Italy, Egypt, Morocco and Algeria.

The project is focusing on the cultivation of the energy crop *Jatropha curcas* L. in small-scale, community-based initiatives for local use in the North African partner countries. The main scope of JatroMed is to reinforce and upgrade the natural and socioeconomic conditions of the target areas and to give local populations the opportunity to produce sustainable energy to cover their own needs. This will be achieved by making small farmers and rural communities familiar with the jatropha cultivation and with the uses of the produced bio-oil and by-products.

Stakeholders and local people, who are the final beneficiaries, are invited to visit the demonstration fields in order to be informed and become familiar with all the cultivation techniques and the stages of production.

Part of the produced oil and seedcake will be used for further analysis and the rest will be offered for free, so as: i) oil will partially cover the local energy needs and people will gain familiarity with its use as a fuel, ii) women will be informed about the use of jatropha oil for soap making and other uses, increasing their opportunities for work and employment, and iii) farmers will be informed so that they can increase their soil fertility and earn additional profit from the utilization of seedcake as fertilizer.

JatroMed demonstration fields

- Borg El Arab / Alexandria district / Egypt
- Hadd Dra / Essaouira region / Morocco
- Adrar / Adrar region / Algeria

Worldwide collection of Jatropha genotypes

A worldwide investigation on Jatropha accessions and on their eco-physiological and yield performances was accomplished. This investigation resulted in the collection of twelve genotypes originated from Mexico (two non-toxic), Dominican Republic, Brazil, Ghana, Mali, Egypt, India (three), Vietnam, and Thailand (Fig. 1).

Two genotypes (one toxic/the JCL Max 3.0 and one non-toxic/the Michoacán) were selected to be commonly planted in all target countries for comparison reasons. The rest were divided into three groups, according to their characteristics and the environmental and social needs of the target areas and were distributed to Egypt (MuCSAT), Morocco (CDTR) and Algeria (CDER). After their germination in nurseries, apart from the two common genotypes, two more (the best germinated) were finally selected and transplanted in demonstration fields (Table 1).

Transplantation, treatments and data collection in the field

Four genotypes per target country have been successfully transplanted outdoor in an area of 4 hectares (1 ha/genotype). Every genotype is cultivated into 24 plots containing 36 plants each, thus in total 3456 plants per country. Three treatments in all 8 possible combinations are applied, namely: irrigation, fertilization and pruning. The experimental layout is a 3X2 factorial experiment in a randomized complete block design, with three replicates. This design was applied in order to investigate the optimum combination of treatments per genotype and per country.

Plant growth parameters are systematically collected from the field, such as: plant height, trunk diameter, number of branches, number of male and female flowers, time of flowering, time of ripening, number and size of fruits and of seeds, and water use efficiency. Also there are some other parameters scheduled to be collected, such as productivity per plant and per genotype, dry matter distribution ratio between coat and seeds, seed oil content and amount of by products (seedcake).



Figure 1. Geographical distribution of Jatropha genotypes collected worldwide

Table 1: Allocation of genotypes to target countries

EGYPT	MOROCCO	ALGERIA
Michoacán (Mexico)	Michoacán (Mexico)	Michoacán (Mexico)
JCLMax 3.0 (India)	JCLMax 3.0 (India)	JCLMax 3.0 (India)
GHS-B (Brazil)	Mali	Veracruz (Mexico)
JAT106 (India)	QVP 3014 (India)	GHN-D (Dominican Republic)

Applied treatments

TREATMENT A: Fertilization (every 15 days)
 Treatment A1: 10 g of urea per plant
 Treatment A2: 10 g of 20 N-20 P-20 K per plant

TREATMENT B: Irrigation (every 7 days)
 Treatment B1: 4L/hour
 Treatment B2: 8L/hour

TREATMENT C: Pruning
 Treatment C1: Cup-shaped plants
 Treatment C2: Tree-shaped plants

Economic and Environmental Analysis

A dedicated activity of the JatroMed project is the Economic and Environmental Analysis of the biodiesel chain production from Jatropha. The main goal of this activity is to analyze and compare the cost of Jatropha seed production in Egypt, Morocco and Algeria, including the application of mechanical harvesting. Furthermore, the cost of transportation and transformation of the seed oil to biodiesel is calculated. Within the current activity, the economic viability of Jatropha oil production is analyzed; moreover, a sensitivity analysis is carried out in order to explore and compare the effects of different production methods, treatments and genotypes.

An environmental and social analysis that focuses on the effect of high and low inputs is implemented to assess the effect of several agricultural treatments on the environment. Alternative land use with normal food crops that could be cultivated in the area is also analyzed. Therefore, this Activity, in general, deals with the sustainability of the production of biofuels from *J. curcas*.

Achieved results so far

- ✓ Twelve (12) Jatropha genotypes have been collected from several parts of the world.
- ✓ Three (3) demonstration fields have been prepared and planted in Egypt, Morocco and Algeria.
- ✓ Three (3) drip irrigation networks have been established.
- ✓ Data for yield and other technical, economic and energy parameters are collected.
- ✓ Field test for the mechanical harvester has been performed.
- ✓ Website, leaflets, conference presentations, media announcements have been released.
- ✓ Knowledge transfer events have been organized.
- ✓ Contacts with local population, stakeholders and farmers have been accomplished.

Mechanical harvesting of Jatropha.

The harvesting of the Jatropha seeds is a difficult process due to the ripening characteristics of the fruits, which do not ripen together, requiring weekly picking and making the harvest demanding for labour. For this reason the definition of the most sustainable harvesting method was investigated. Three harvesting methods were identified, namely: manual harvesting, facilitated harvesting, and complete mechanical harvesting. Manual harvesting system was considered since a few years ago it was the only method of harvesting Jatropha, and it remains so far the most widely used.

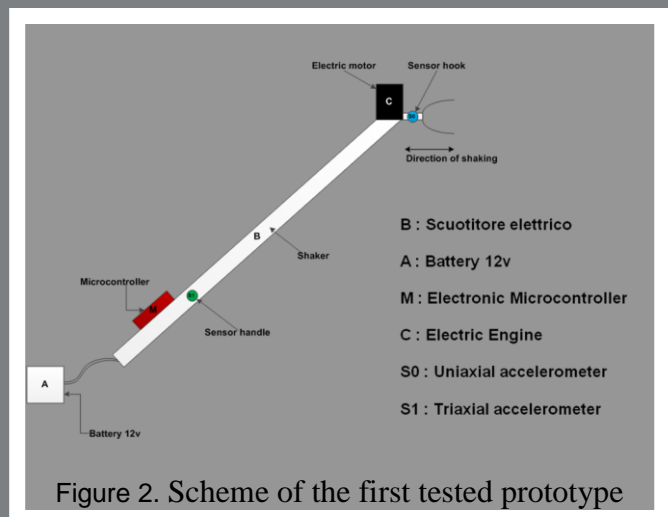


Figure 2. Scheme of the first tested prototype

A first test of Jatropha harvesting was carried out with an olive picker (Electri K 1500 of Sbaraglia s.r.l.) that works as a fruit beater, modified by CRA-ING to be used as a branch shaker (Fig. 2). The preliminary field test was held in Agadir (Morocco) from 23rd to 25th October 2012 at the Foundation du Sud, a Moroccan NGO founded in 2004 for social and ecological scopes.



UPCOMING TRAINING COURSES.

The knowledge transfer events disseminate the outcomes of the project and provide information and training on *Jatropha curcas* cultivation and adaptability, cropping system and management, mechanical harvest, oil extraction methods, produced oil as biofuel, other uses of jatropha oil, uses of plant parts and by-products. They are open to stakeholders and final beneficiaries and are free of charge. Within each event a visit to jatropha plantations will be organized and an information leaflet in English and local language will be distributed.

EGYPT

1st "TRAINING THE TRAINERS"

EVENT

Date: 20-22 May 2013

Location: Borg El Arab, Alexandria district

Field visit: 22 May 2013

SEMINARS (three)

To be announced

MOROCCO

1st "TRAINING THE TRAINERS" EVENT

Date: 1-2 June 2013

Location: Marrakesh (first day) and Essaouira (field visit)

Field visit: 2 June 2013

SEMINARS (three)

1st SEMINAR

Date: 3-4 June 2013

Locations: Ounagha in Essaouira

Field visits: 4 June 2013

2nd and 3rd SEMINARS

To be announced

ALGERIA:

1st "TRAINING THE TRAINERS"

EVENT

Date: 11-12 June 2013

Location: Adrar

Field visit: 12 June 2013

SEMINARS (three)

To be announced

For More information and registration please sign up and fill the dedicated form in our website.

http://www.jatromed.aua.gr/index.php?option=com_content&view=article&id=17&Itemid=37&lang=en

JatroMed partners:

- Agricultural University of Athens (AUA), Greece (Co-ordinator)
- Consiglio per la Ricerca e Sperimentazione in Agricoltura Agricultural Research Council (CRA ING), ITALY
- City for Scientific Research and Technology Applications (MuCSAT), EGYPT
- Centre de Developpement de la Region de Tensift (CDRT), MOROCCO
- Centre de Développement des Energies Renouvelables (CDER), ALGERIA



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