

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)

JatroMed (JATROpha in MEDiterraneo) is a 4-year European funded project (Ref. No.: DCI/ENV/2009/13/12) aiming at:

1. demonstrating to small farmers and rural communities of Egypt, Morocco and Algeria the possibility to cover their energy needs by using the bio-oil produced from *Jatropha curcas* L.
2. making the target groups and local stakeholders familiar with the *jatropha* agricultural management and logistics, as well as with the multiple uses of the produced oil and by-products.

JatroMed demonstration fields

The demonstration fields of the project in Egypt, Morocco and Algeria have been successfully established.

In Egypt, the transplantation of the genotypes Michoacán (common for all partners, non toxic, originated from Mexico), JCLMax 3.0 (common for all partners, from India), GHS-B (from Brazil) and JAT106 (from India) has been successfully accomplished in July 2012. The irrigation and fertilization treatments started on 21st July 2012, while the pruning was accomplished on 25th February 2013. This first pruning was giving the plants cup or tree shape (third treatment examined). The plants are healthy and growing very well. The first production of fruits has been harvested and the first oil production has been extracted in August 2013.

In Morocco, the transplantation of genotypes Michoacán, JCLMax 3.0, QVP 3014 (from India) and Mali (from Mali) has been accomplished in September 2012 with a 100% success. The pruning was conducted on 17th February 2013 and the irrigation and fertilization treatments were applied on 31st March 2013. Meteorological data is continuously taken by the installed weather station. The plantation is very well established and all plants are growing well.

In Algeria, the transplantation was delayed due to the unusually extreme high temperatures (up to 50 °C) during the summer 2012, as well as to the worm winds and the sand storms. A direct sowing in the field of the genotypes Michoacán and Veracruz (non toxic, originated from Mexico) was accomplished on 24th October 2012, while genotypes JCLMax 3.0 and GHN-D (from Dominican Republic) were sown on 8th November 2012. Additionally, seeds from all genotypes were sown in a nursery, in order to obtain plants to be used to cover any failure of the direct sowing. A well established *Jatropha* plantation and a successful plant growing is the result of the above mentioned.



Jatropha curcas L. of the Euphorbiaceae family

Announcement

JatroMed First International Workshop on
Energy Crops in the Mediterranean
Region (ECMR-1)

Opportunities and challenges

November 15th, 2013, Marrakech Morocco
(for further details, please see last page of
this newsletter)



Coordinator:

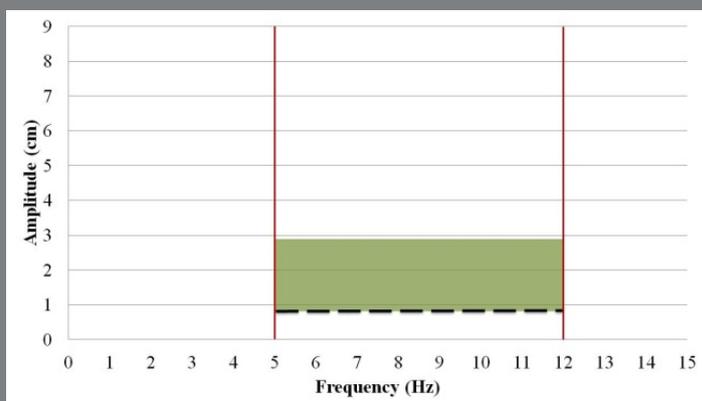
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Mechanical harvesting of jatropha

Preliminary test of mechanical harvesting of jatropha fruits in Morocco revealed that due to the low cost and maintenance, the hand-held picking machines are the most affordable mechanical harvesting system for the rural community of North Africa, and a tremendous promise to reduce labor intensity and harvesting costs. CRA-ING carried out preliminary harvesting tests near Agadir (Morocco), on a three-year old jatropha field property of a local NGO, the "Fundation du Sud" (www.fondationsud.org) in October 2012. In this first test the electric harvesting picker was modified to work as a harvesting shaker.



Amplitude and frequency combination under investigation.

Red vertical lines: frequency limits safe for worker health;

dotted black line: level of amplitude and frequencies tested

Following the underlying principle to minimize the modifications on the device in this first stage, the default amplitude of the device was left unchanged (0.7 cm). During the tests four frequencies (5 – 7 – 9 – 12 Hz) between 5 to 12 Hz (frequencies range that have been identified as safe for the worker) were tested with 20 trees randomly chosen. The tests revealed that the amplitude of 0.7 cm was not enough to drop the fruits, even when the frequency was increased until the maximum frequency (20 Hz), over the safe limit for worker health. For this reason, the increase of the amplitude will be further analyzed for the selective detachment of the ripe jatropha fruits. According to recent studies, in the previous figure is indicated the area of amplitudes and frequencies for investigation in future tests.

Data collection in the fields and laboratories

Several plant characteristics and productivity parameters are recorder at the field (twenty measurements) and at the laboratory (thirteen measurements). The data is collected from the demonstration fields every 15 days and is subjected to statistical analysis. The measurements concern mainly the plant phenology, flowering, fructification, ripening, seed and oil production, inputs and logistics.

JatroMed demonstration fields

Photographs from the demonstration fields in the three North Africa countries:

Borg El Arab / Alexandria district / Egypt



Hadd Dra / Essaouira region / Morocco



Adrar / Adrar region / Algeria



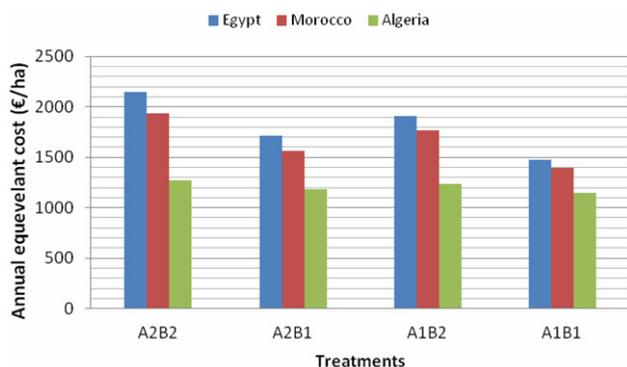
Collaboration/synergies/links developed with other projects

- Collaboration between JatroMed and the project "Jatropha curcas in Tunisia", with coordinator Prof. Dr. Khouja Mohamed Larbi, Laboratoire d'Ecologie Forestière, INRGREF, Tunisie.
- Collaboration and synergy between JatroMed and PRO.HU.VE (an EU-ENPI funded project). Meeting with the coordinator of PRO.HU.VE Dr. F. Pernice, from the institute Organizzazione per lo sviluppo delle energie alternative, rinnovabili cooperazione e health S.E.A.R.C.H. ONG (www.searchong.it).
- Link connection between JatroMed website and the JATROMA project website: http://www.biomatechnologies.it/en/project_jatropha_curcas.php.

Economic and Environmental Analysis

A dedicated activity of the JatroMed project is the Economic and Environmental Analysis of the Jatropha cultivation and production. 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.

From the first results obtained, the irrigation cost is one of the highest costs, significantly contributing to the total costs. The annual equivalent costs per country and per treatment, according to the data collected from the project partners and processed, are depicted in the following figure.

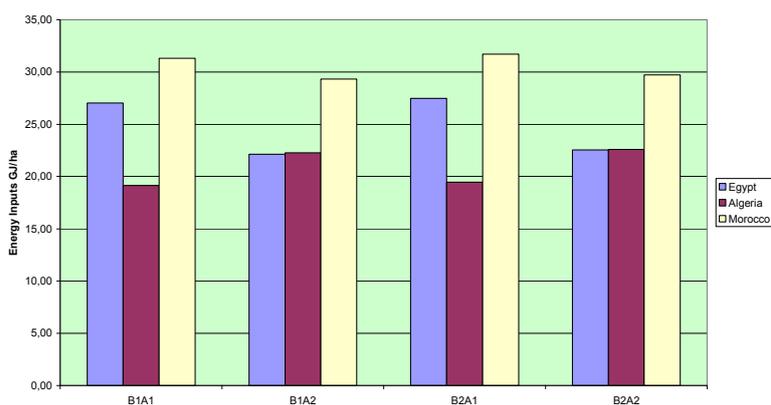


Treatments: A1/A2: low/high fertilization, B1/B2: low/high irrigation

Also, it has been observed that the net present value is most of the times positive, resulting to a net profit obtained from the cultivation of *Jatropha curcas* L. (for most of the treatments investigated), considering a selling price of Jatropha seeds equal to 200 €/ton and a Jatropha yield from the first harvesting year at 2 ton/ha up to the maximum of 12 ton/ha at the fifth year and afterwards. Such results will be re-evaluated during the project, when further data are collected and processed.

The highest net profit (based on annual equivalent costs/profits) was observed in Algeria (around 900 €/ha), due to the lower fertilization applications, although in the two other countries the net profit was high enough and in the range of 600 €/ha. Also, the first calculations, including some estimated parameters (such as the jatropha yield), revealed that the treatment that includes low fertilization and irrigation showed the highest profit (A1B1), while the treatment that includes both high fertilization and irrigation (A2B2) has the lowest profit (in some cases it is even negative).

The energy input per country and treatment is shown in the following figure, according to the data collected from the partners.



Treatments: A1/A2: low/high fertilization, B1/B2: low/high irrigation

Significant energy is required from the materials used, such as fertilizers and soil improvers. Overall, the demo field in Algeria requires the lowest energy input, while the one in Morocco the highest, mainly due to the high fuel consumption.

Project presentations in conferences and workshops

The project scope and results have been presented in the following International Conferences and workshops:

1. Genetic characterization of *Jatropha curcas* L. accessions from different countries. E.G. Papazoglou, D. Trebbi, M. Rashad, A. Outzourhit, A. Sadi, L. Pari, D. Megadouka. 9th Int. Phytotechnology Society (IPS) Conference, September 2012, Hasselt, Belgium.
2. JatroMed project. E.G. Papazoglou, P. Trigas. 2nd Agricultural Biotechnology Conference, October 2012, Athens, Greece
3. JatroMed project. A. Outzourhit, A. Ouhammou. "Goat fair" organized by the Direction Provinciale Agricole of Essaouira, November 2012, Essaouira, Morocco.
4. Economics and Environmental Analysis of the JatroMed project. E. Mohamed. Workshop on Bio-Fuel Production, Organized by MuCSAT and Yonsei University of S. Korea, February 2013, Alexandria, Egypt.
5. Implementation of *Jatropha curcas* in Egypt. M. Rashad. Workshop on Bio-Fuel Production, Organized by MuCSAT and Yonsei University of S. Korea, February 2013, Alexandria, Egypt.
6. Evaluation of the energy crop *Jatropha curcas* as a mean to promote renewable and sustainable energy for the Mediterranean region. A. Outzourhit, A. Ouhammou. Brokerage event, entitled: Innovative Technologies for Water Management in Industry and Agriculture, organized by the Centre National d' Etudes et de Recherché sur l'Eau et de l' Energie (CNEREE) of the Cadi Ayyad University, in partnership with the Antonymous University of Barcelona, March 2013, Marrakech, Morocco.
7. JatroMed project - Evaluation of the energy crop *Jatropha curcas* as a mean to promote renewable and sustainable energy for the Mediterranean region. E.G. Papazoglou, K.G. Serelis, E. Mohamed, S. Kyritsis, A. Outzourhit, A. Ouhammou, M. Rashad, A. Sadi, A. Bouhdjar, L. Pari, A. Suardi. 21st European Biomass Conference and Exhibition, June 2013, Copenhagen, Denmark.
8. Semi-mechanical harvesting of *Jatropha curcas*: a preliminary study in North Africa. L. Pari, A. Suardi, S. Figorilli, L. Fornaciari, A. Scarfone, E. Santangelo, E.G. Papazoglou. 21st European Biomass Conference and Exhibition, Copenhagen, Denmark, June 2013.
9. *Jatropha curcas* L: a multipurpose energy crop for bio oil production. E.G. Papazoglou. 4th Int. Conference on Environmental Management, Engineering, Planning and Economics (CEMEPE 2013) and SECOTOX Conference, June 2013, Mykonos, Greece.
10. Marginal land exploitation by physic nut. K. Serelis, E.G. Papazoglou, A. Tsigoida. 4th Int. Conference on Environmental Management, Engineering, Planning and Economics (CEMEPE 2013) and SECOTOX Conference, June 2013, Mykonos, Greece.

Seminars

Seminars addressed to local farmers and stakeholders, rural communities, woman and public have been organized as follows:

	Place	Date
Egypt	Borg El Arab	8-9 June 2013
	Port Said	12 June 2013
	Alexandria	16-17 June 2013
Morocco	Ounagha-Essaouira province	3-4 June 2013
	Chichaoua province	23 June 2013
	Ait Ourir -Alhaouz province	26 June 2013
Algeria	Adrar	24-25 June 2013

Seminar in Egypt



Seminar in Morocco



Seminar in Algeria



Training events in Egypt, Morocco and Algeria

Three training/knowledge transfer events have been implemented in Egypt (20-22 May 2013), Morocco (1-2 June 2013) and Algeria (11-12 June 2013) with almost 100 participants in total (including stakeholders and final beneficiaries). These events were mainly addressed to agronomists and local scientists, who have the capacity to train subsequently local farmers, rural communities, woman and interested public. Stakeholders, representatives from ministries and institutions, politicians and investors were among the attendees. The participation was free of charge, in order every interested person to participate. These events have successfully disseminated the JatroMed project, its activities and outcomes. Specifically, various activities relevant to the *Jatropha curcas* L cultivation and adaptability have been presented, providing some insight as well on the alternative uses of jatropha oil and its by-products.

Within each event a visit to jatropha plantations was implemented and an information leaflet in English and the local language have been distributed.

Demo field visit in Egypt



Demo field visit in Morocco



Demo field visit in Algeria



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Announcement of Int. workshop in Morocco (15th November 2013)

An international workshop is planned to take place in Marakech, Morocco on the 15th of November 2013 within the framework of the JatroMed project. The objective of this workshop is to provide a platform to discuss the opportunities and challenges associated with the introduction of the energy crops in the Mediterranean region. A special attention will be given to *Jatropha curcas L.* which has demonstrated considerable potentials and multiple uses. The topics include (but are not limited to): energy crops for the Mediterranean region, *Jatropha curcas L.*: cultivation, water and soil needs, harvesting, oil extraction and uses, uses of by-products, Socio-economic and Environmental impact assessment, etc. For further information, please contact:

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JatroMed project 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 Développement de la Région de Tensift (CDRT), MOROCCO
- Centre de Développement des Energies Renouvelables (CDER), ALGERIA



For further information on the **JatroMed** project, please visit the project website (www.jatromed.aua.gr) or contact the project coordinator:

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