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MANAGEMENT AND BIOFERTILIZATION TOWARDS SUSTAINABLE PRODUCTION OF *JATROPHA CURCAS* FOR BIODIESEL PRODUCTION

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In 2007, European Union leaders proposed that by 2020 the EU would reduce emissions of carbon dioxide and other warming gases by one-fifth from 1990 levels, and increase its use of renewable energy sources to a 20% of all the energy needed. Biodiesel is one of the alternatives and countries like Germany are leading in using biodiesel derived from rapeseed oil. Biodiesel pollution may be 20% less than that produced by diesel. Growing crops for biodiesel production must consider sustainability, otherwise energy balances could be negative. It was estimated that the use of chemical fertilizers makes crop production less profitable and nitrogen fixation has been recommended. The use of biofertilizers to promote nitrogen fixation saves millions of dollars and reduces dependence on chemical fertilizers.

Jatropha curcas has attained worldwide interest for biofuel production and it is the aim of our work to attain sustainability by management and the use of biofertilizers. Cell cycle and energy balances will be explored. Mexico has non-toxic *Jatropha curcas* that are edible for humans and is the center of origin of the species. We collected *J. curcas* from different geographical regions in Mexico (Michoacán, Puebla, Guerrero, Veracruz, Oaxaca, Morelos and Chiapas) and obtained seeds from India and Brazil. We plan to examine *J. curcas* diversity using plant molecular markers.

Seeds were germinated in the laboratory, transplanted to green houses and to fields in Miacatlán, Morelos and in the UNAM station at Rio Tembembe. Soil characteristics have been determined. Miacatlán has very poor soils and compost has been added as part of the management practices.

Towards identifying plant growth promoting bacteria, root-associated isolates have been obtained from roots of several of the ecotypes grown in the laboratory using different media. Identification was performed from the analysis of the sequence of 16S ribosomal RNA genes from PCR products and a diversity of genera and species was encountered, most of them related to endophytes (bacteria inhabitants of root tissues that do not cause harm and may be beneficial to the plants, Rosenblueth and Martinez Romero 2006) described in other plants or root associated bacteria, but representing novel genotypes, perhaps more adapted to *J. curcas*. Some of the bacteria isolated from Brazilian accessions corresponded to *Stenotrophomonas*, which are opportunistic human pathogens. These were not obtained from Mexican isolates. These results caution against the introduction of seeds from other regions that may be carriers of pathogens. The results support the usefulness of adequately identifying bacterial species before using them as inoculants in the fields.

The bacteria were tested for growth promotion in growth chambers in pots with vermiculite and Fahraeus medium. We found significant increases with few of the tested isolates, and plan to test them in the field. Additionally, bacteria were identified using a culture-independent approach and we found novel bacteria.

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References

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