

***Jatropha curcas*: what sustainability?**

Since a few years *Jatropha curcas* L. is considered as one of the most promising solutions to the climate changes, energy security and rural poverty issues affecting the world. Among all the oil bearing crops, it has emerged as the focal point for the bio-fuel industry with rapid research & development investments flowing into its cultivation, processing and conversion in bio-diesel. Primary characteristics favouring *Jatropha* over other bio-fuel feedstock crops are its non food nature, its multiple uses (oil production, plot delimitation, traditional medicine, pest control, etc.), reported ability to grow on marginal land and the need for limited rainfall. There are also claims of *Jatropha* interest in preventing deforestation and desertification, and improving soil fertility. All these putative assets have made *Jatropha* a kind of “wonder shrub” which attracts investors as efficiently as the El Dorado legend the Conquistadores four hundred years ago. However, as recently put in evidence by Achten *et al.* (2008)*, serious scientific and technical efforts are still needed to understand fully basic agronomic properties and possible environmental risks of the crop. *J. curcas* is still a wild plant which exhibits a lot of variability in yield, oil content and oil quality. Contrary to what is often announced on the internet, it cannot perform all its functions together (oil-production, land reclamation, erosion control, etc.) at the best level without adequate external input applications. Based on the available information, it is still difficult to conclude if *J. curcas* is globally a sustainable alternative for fossil fuels. It is expected to produce oil in a renewable way but it is not yet clear at which cost. When marginal lands are exploited, the impact on the soil seems to be positive, depending on used practices and type of soil but its contribution to soil restoration might be obtained at the expense of biodiversity loss. The environmental impacts are lower when *J. curcas* is exploited at local scale, thanks to the reduction of the energetic cost related to transportation, and when the by-products of the bio-diesel production system are efficiently used. With respect to land-use and water resource pressures there is well-founded concern that expansion of *J. curcas* cultivation could be at the expense of food production in many rural areas. Though amenable to growing on marginal land, commercial pressure to maximise profit is likely to result in best lands and ground water resources being appropriated for *Jatropha* cultivation. Another critical point concerns the social sustainability of the *Jatropha* cultivation. Huge *Jatropha* centralized estates, even employing thousands of workers, aiming at producing bio-fuel for the national or international markets won't certainly have equivalent economic, environmental and social impacts as individual farmers producing on their own land the same volumes of *Jatropha* oil. Rural development obtained through the set up of decentralized *Jatropha* production and marketing chains should be socially, economically and environmentally more sustainable than the benefits generated by large-scale estates even if job creation in those centralized systems comply with national and international labour standards. We have learned from history that the strengthening of family agriculture is the backbone of a harmonious and efficient rural development. In most African countries where land is “de jure” owned by the state, the possibility of appropriation of huge estates by private companies interested in the lucrative biofuel markets put at risk the tenure security of poor farmers and threatens the perspectives of a well-balanced local development. Linking the production of *Jatropha* to a variety of appropriate technologies, such as local diesel electricity generators, vegetal oil stove and lamps, unsophisticated soap-producing plants, simple food-processing machinery, allows generation of regional value chains that expand employment opportunities. If people can produce oil directly in villages and transform it themselves in bio-fuels using decentralized plants they can achieve energy self-sufficiency and open the door to sustainable development. To assure the most sustainable exploitation of the indubitable potentialities of *Jatropha curcas* the efforts should be concentrated on the alleviation of the constraints that limit its cultivation on marginal lands and in traditional farming systems. The development of productive agro-forestry systems involving *Jatropha* with low quantities of external inputs is certainly a priority. This means the selection of genotypes able to produce profitably in suboptimal conditions and the development of production practices that are best adapted to grow these genotypes in association with food crops. Another crucial issue concerns the creation of decentralized production and marketing chains allowing the valorisation of *Jatropha* production at a local scale. Coordinated research and development actions carried out at national and international levels are necessary to reach a real sustainable *Jatropha* production. All persons interested in this enterprise can consult the following internet site: <http://www.ifad.org/events/jatropha/index.htm>.

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*Achten WMJ, Verchot L, Franken YJ, Mathijs E, Singh VP, Aerts R, Muys B *Jatropha* bio-diesel production and use. *Biomass and Bioenergy* (2008), doi :10.1016/j.biombioe.2008.03.003.