Highlights of the *Jatropha curcas* Evaluation Program (JEP): crop management and the fate of press-cake and other by-products with its effects on environmental sustainability

Topic I – *Jatropha curcas* cultivation

Oral presentation

R.E.E. Jongschaap[1a], L.R. Montes Osorio[2], F.J. de Ruijter[1b], E.N. van Loo[1c]

[1] Wageningen University and Research centre – Plant Research International, Droevendaalsesteeg 1, NL-6708PE Wageningen, The Netherlands; [2] Biocombustibles de Guatemala S.A, 17 Calle 10-31, Zona 10, Guatemala City, Guatemala

[1a] T +31 317 480570; E raymond.jongschaap@wur.nl; [1b] T +31 317 480531; E frank.deruijter@wur.nl; [1c] T +31 317 480879; E robert.vanloo@wur.nl; [2] T +502 40 269134; E luisrodolfomontes@yahoo.com

Abstract

Jatropha curcas production varies greatly and profitable claims without well-founded proof or reliable sources of information are floating around the internet. Being an uncultivated wild-species, it is not known what the environmental and the genetic influence is on oilseed production. This information is critical to increase the chances of *Jatropha curcas* development programs with appropriate knowledge on how to cultivate what line of jatropha under which environmental and agronomic conditions.

The J*atropha curcas* Evaluation Program (JEP) was executed between 2006 and 2010 by Wageningen University and Research centre – Plant Research International. It was funded by Stichting Het Groene Woudt, The Netherlands. The objectives of the program were to 1) minimize risks involved in the introduction of *Jatropha curcas* as oil producing crop in developing countries, 2) focus on productivity in relation to genetic resources, environmental settings and crop management, 3) integrate a wide range of global experience and global collections of *Jatropha curcas* in the analyses and 4) share project results and analyses. Cultivated and wild-lines of *Jatropha curcas* were collected globally with associated 'passport data'. The required data include information on productivity, oil contents, growth conditions, agronomic practices, propagation methods and sensitivity to pests and diseases. Living gene pools were maintained in their originating countries and field experiments were analyzed for a better understanding of the risks involved.

One aspect of risk with the introduction of jatropha is the effect of site selection, the selection of the production system (monoculture, intercropping or hedge) and agronomy practices on the environmental sustainability. Scarce resources such as soil fertility and water can easily be depleted if replenishment of nutrients is not secured, especially in the often fragile soil systems where jatropha is promoted for.

In the case presented during ICJC2010 in Groningen, The Netherlands, it is demonstrated that jatropha requires an unexpected high amount of nutrients in its establishment phase to produce the standing biomass of a plantation. Depending on the fate of pruning materials (left in the field or removed) and on the option to return fruit coats and press-cake after oil extraction to the production fields or find different outlets for these by-products, additional fertilization is required to retain or improve the soil fertility status. In the example it will be demonstrated that nutrient recycling during leaf senescence when jatropha enters the dormancy phase, only partly preserves the required nutrients for subsequent growth in the next production cycle. Because of relatively low fertilizer recovery percentages for nitrogen (N), phosphorous (P) and potassium (K), the required fertilizer rates to secure sustainable production systems, can be high.