Positioning Paper

“Mini-Review on *Jatropha Curcas*”

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Amateurs damage the potential benefits of *Jatropha curcas*

In the first decade after 2000, *Jatropha curcas* was propagated in an actionist manner by mainly British authors and "researchers" as a new crop with almost miraculous benefits for Africa. Hardly any country on the continent was spared from cultivation demonstrations. The literature mentions, among others, British Petroleum with numerous small cultivation areas in many countries. Tragically in the context of this initial Jatropha boom, many farmers in the villages of Africa fell for the dubious propaganda, often sacrificing valuable subsistence agriculture areas and ultimately not achieving the promised economic returns. As a result, people turned away and formed their own negative opinion about Jatropha.

The reason for the dubious advertising and the persuasion for cultivation was the consistently practiced use of local *Jatropha* varieties, which, in the typical manner of wild populations, vary widely in their characteristics and yields.

Becker and Makkar already discussed this in their publication *Jatropha curcas: A potential source for tomorrow's oil and biodiesel, May 2008, Vol. 20, No. 5, Lipid Technology*:

*"*Productivity of *Jatropha curcas* wild germplasm: Productivity reports on *J. curcas* yields vary from less than 100 kg to more than 10 tonnes of seed per ha. Currently various agronomic important factors such as planting density, nutrient and water demand and pruning time are being investigated. Because of the wild nature of the plant, morphological characters and oil contents and other chemical constituents vary considerably among different provenances of *J. curcas*. This huge variation is of importance from a breeder's point of view for future selection and breeding programmes. Such a programme is an essential prerequisite for the economic exploitation of *J. curcas*."

Following the described rationale, the group around Becker collected variants of *Jatropha curcas* worldwide and initially worked on them with the aim of isolating varieties, testing the suitability for different locations and determining yields. The result of these years of scientific work is a that an adapted cultivation of *Jatropha curcas* is now possible. The previously often stated doubts regarding the toxicity of *Jatropha* (meaning the content of phorbol esters) is no longer generally valid. In the meantime, there are *Jatropha* varieties with and without phorbol esters. Furthermore, there is a technically simple and patented process for "detoxification". Nowadays, there are established *Jatropha* varieties with known proven properties on the market. As a result, it can be stated that today *Jatropha* can be handled specifically. It no longer needs to be dealt with a volatile performing wild plant, it is now possible to calculate yields via the cultivation of varieties. In other words: it is possible to repeat results, which is not possible with randomly locally existing wild varieties. Thus, the disappointments caused by an amateurish "rush to market" have become controllable.

Today, oil properties such as the suitability for food products or a maximized yield can be achieved via the selection of respective *Jatropha* varieties. Even hybrid seeds are available already.

Apart from vegetable oil, various beneficial side-effects and by-products are delivered by *Jatropha*. One example for a positive side effect is the contribution of *Jatropha* to the formation of soil organic carbon, which is important considering the carbon balance of the overall production system. Moreover, after the pressing process of Jatropha seeds, a high quality press cake with over 60% crude protein and of high biological value is obtained.

Targeting an organic vegetable oil production, the following section delivers a comparison between palm oil, soybean oil and *Jatropha* oil according to *Ohlde, unpublished data, 2023*:

"When screening common oil crops, Jatropha has to be evaluated in the field of competitors. Possible alternatives for palm oil, the world leading oil crop, are coconut, sunflower, soybean and rapeseed oil. However, palm oil is superior to all these vegetable oils in terms of productivity per hectare: To produce the same amount of oil, four to nine times more land is needed than with palm oil. However, the higher productivity of the oil palm comes at the expense of water consumption. Other oil plants require only 30 to 70 percent of the water used by oil palms. However, if we look at the water consumption per kg of oil produced, we see that this is lower for palm oil than for all other types of oil due to the limited area required.

Production parameters in oil-crops

Parameter	**Unit**	**Jatropha curcas**	**Palmoil***	**Soybeanoil***
Yield	kg oil/ha	2.000	4.000	600
Land consumption	ha/kg oil	0,0005	0,00025	0,0017
Water consumption	m^3/kg oil	4,5	4,25	10
Water consumption	m^3/ha	9.000	17.000	6.000

* *https://ethz.ch/de/news-und-veranstaltungen/eth-news/news/2018/10/blog-manoli-palmoel.html*

Jatropha oil shows a very similar general productivity when comparing with palmoil. It produces less oil per ha but needs only half the water. Jatropha's water use efficiency is almost as high as the one in palmoil. Considering Jatrophas additional by-product "press-cake", respectively protein in the press-cake, Jatropha turns out to deliver a superior area productivity or output per ha."