UNIVERSITY OF HOHENHEIM

Acrocomia at a Glance

(dated 04/2018)

200 YEARS 1818 2018

Local names
Macaw palm (engl.)
Mbokaya (Paraguay)
Macaúba (Brazil)
Coyol (Costa Rica)
Acrocomia (dt.)

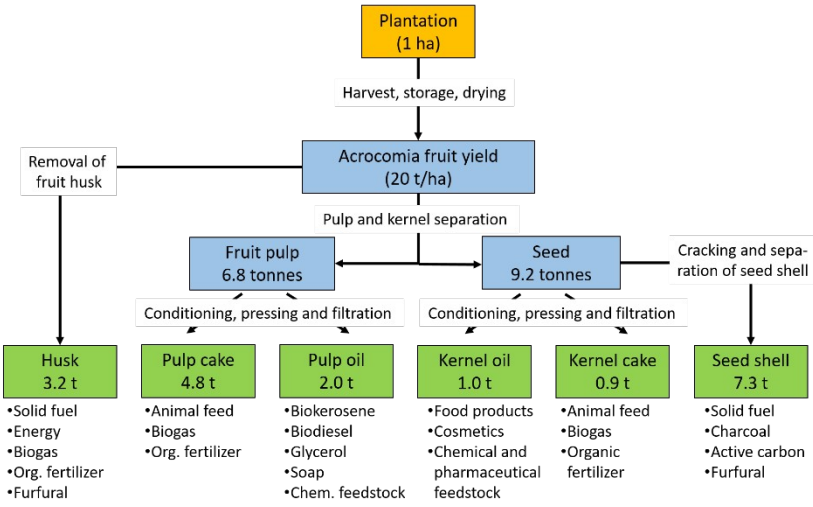
Systematic
Family - *Arecaceae*
Genus - *Acrocomia*
Species - *A. totai/A. aculeata*

Origin and distribution
- Mexico to northern Argentina
- Natural occurrence in forests and savannah
- Indigenous use already in pre-Columbian times

Ecophysiological requirements
- Grows in both, tropics and subtropics including transition areas to the warm temperate latitudes(30° north and south of the equator)
- Semiarid, subhumid und humid climates
  → Annual rainfall: (700) – **1000 to 2000** – (2500) mm
  → copes with dry periods of up to 6 months
  → Temperature optimum: 20-28°C
- Frost tolerant for short time (up to -5°C) with minor yield impact as well as high temperatures and intensive solar radiation
- Sandy to clayey soils, low demanding in terms of nutrients

Yields
- Ø 40 - 45 kg fruits per palm (highest yields up to 100 kg)
- Ø 20 - 22,5 t of fruits per hectare and year (with 500 palms per hectare)
- Fruits drop when ripe, therefore use is possible for long periods

Diversity in exploitation



Source: A is for Acrocomia. Biofuels International 9[5] (2015). S. 24-43, modified

Habitus of *Acrocomia aculeata*

Inflorescences with basal female and terminal male flowers

Fruit bunch with up to 400 single fruits

Cross section of fruit: 4-7% oil in kernel, 5-24% oil in the pulp

Oil composition (comparison African oil palm and Acrocomia)

Fatty acids in %	African oil palm*		Acrocomia -- Paraguay **--		Acrocomia ---Brazil* ---		Remarks
	Pulp	Kernel	Pulp	Kernel	Pulp	Kernel	- = no information n.d. = not detectable
Saturated fatty acids	-	-	37,0	71,3	-	68,5	
Palmitic acid (C16:0)	35-47	6,5-10	29,0	6,95	19,6	6,0	
Lauric acid (C12:0)	<0,4	41-55	1,37	41,0	-	57,9	
Single unsaturated fatty acids			60,8	25,8	63,7	10,2	
Oleic acid (C18:1)	36-47	12-19	57,4	25,6	61,0	10,2	
Palmitoleic acid (C16:1)	<0,6	2,7	3,34	6,65	2,7	-	
Polyunsaturated fatty acids			2,21	3,01	14,0	-	
Linoleic acid (C18:2)	8,5-15	12-19	1,82	3,01	13,3	-	
Linolenic acid (C18:3)	<0,5	0,7	0,39	n.d.	0,7	-	

Sources:
* Universidade Federal de Viçosa, Minas Gerais, Brazil
** Universidad Católica Itapúa, Paraguay

Silvopastoral system: Acrocomia with cattle

Agroforestry system: Acrocomia and various fruit species

Agroforestry system: Acrocomia with cassava and groundnuts

Agroforestry system: Acrocomia and macadamia nuts

Advantages

- Compared to the African oil palm, Acrocomia grows well in a much wider geographic distribution range (30° north and south of the equator *vs*. 10°north and south of the equator, respectively).
- Due to Acrocomia‘s adaptation to cooler and warmer climate zones, its oil quality and fatty acid composition shows huge variability across location. In general, the amount of essential fatty acids increases with cooler temperatures. This usually happens when moving from the equator to the higher latitudes.
- Acrocomia is rather drought tolerant, because of its deep rooting systems. It occurs in semiarid regions of Brazil (cerrados) and Paraguay (chaco), characterised by prolonged dry seasons of six months and frequent dry spells of up to 4 weeks within the rainy season.
- Depending on its later use, fruit storage is possible for a longer period.
- Decentralized oil production is possible; oil extraction is economic with 5.000 tons of fruits per year (= 250 ha).
- Sustainable cropping through integration in natural ecosystems, mixed cropping with annual and perennial crops as well as agrosilvopastoral systems and carbon sequestration (long-term effect as Acrocomia can be cropped for 70 years and more).
- Socio-economically viable through participation of peasant farmers in agroforestry systems.
- Acrocomia oil can be used for food applications and is an excellent oil source for the cosmetic and chemical industry; residues from the oil extraction are valuable sources for other technical applications. Acrocomia cropping, hence, fosters diversification of agricultural production, allows farmers access to various markets and enhances their integration into bioeconomy.

Knowledge gaps

- Lack of information on genotype x environment interactions; this is important for:
  - Selection of genotypes for distinct applications
  - Selection of types with specific fatty acid spectra for food and bio-economic applications
  - Breeding of (high yielding and various oil compositions) varieties
- Environmental impact on yield and quality of Acrocomia fruits
- Environmental impact on distribution of female and flowers in inflorescences
- Fertiliser demand of macro and micronutrients and impact on yield and oil content and quality
- Evaluation of cropping systems and options for large- and small-scale farming

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