



Task 2.3: Integrated assessment of fibre crops: socio economic and environmental implications

**FIBRA Technical Meeting and Seminar “Fibre crops in biorefinery concept”
Helsinki, March 24, 2015**

Michael Carus
CEO, nova-Institut GmbH, Hürth (Cologne), Germany



Objective of Task 2.3

- The objective of Task 2.3 is to provide an integrated assessment of fibre crops in terms of socio-economic and environmental implications.
- This task should provide a synopsis of the state-of-the-art knowledge on socio-economic and environmental issues in relation to the production of fibre crops mainly based on literature review and for the situation in Europe and China.
- The impact of cultivation on biotic and abiotic resources, through the analysis of the crop's interaction with the environment, management and logistics options will be evaluated.
- The deliverable D2.3 (sent to the FIBRA partners in November 2014 for feedback) will be updated until the end of the project.



Methodology

- There are currently several different activities going on at the global, European and national level aiming at sustainability standardization and certification of biomass for material uses.
- These activities are of particular interest for producers, traders and industrial users of natural fibres since they may in the future have to comply to these standards or may need to acquire sustainability certifications in order to respond to consumers' demand for environmentally and socially equitable products.
- We therefore assess the environmental and social properties of natural fibres along the main standardization and certification schemes that are currently developed.



Methodology

- From different schemes, the CEN standard for the sustainability of bio-based products (CEN/TC411/WG4) is likely to be the most relevant on a European scale.
- From In the following, we discuss and evaluate natural fibre crops along the sustainability criteria as proposed in the current draft of the CEN standard.
- The environmental criteria have been looked at in detail by Ana Luisa, so we discuss here only the social and economic criteria.



Overview of the CEN criteria

Sustainability criteria	Principles
Environmental criteria	Promote good air quality and climate protection.
	Conserve and protect water resources.
	Protect soil quality and productivity.
	Promote the positive and reduce the negative impacts on biodiversity.
	Promote efficient use of energy and material resources and the prevention of resource depletion.
	Promote responsible waste management.
Social criteria	Respect labour rights.
	Respect land use rights (labour rights, working and living conditions)
	Respect water use rights.
	Promote local development.
Economic criteria	Produce and trade bio-based products in an economically and financially viable way.



Methodology

- A table was sent to the FIBRA partners in Autumn 2014, providing a first evaluation of jute, kenaf, hemp and flax along the CEN criteria.
- This evaluation showed large data gaps for jute and kenaf:

Note: The evaluation is concerning mostly only the "Criteria" (column E); these criteria ask whether providers of bio-based products (in our case, natural fibres) comply with the principles given in column D.

Legend: ? The evaluation is not known for sure - this criteria has to be looked at in detail in case of a certification
 ++ very good implementation/ fulfillment of the criteria
 + good implementation/ fulfillment of the criteria
 +/- some points of the criteria are implemented/ fulfilled, some are not
 - no implementation and fulfillment of the criteria

					Fibres and their countries of evaluation			
					JUTE	KENAF	HEMP	FLAX
Sustainability Aspects [CEN]	Sub-aspects [CEN]	Principles [CEN]	Criteria [CEN]	Indicator [CEN]	Bangladesh / India	Bangladesh	Europe	Europe
Social	legality (social)	Respect applicable laws and regulations related to social principles.	Compliance with all applicable laws and regulations, on labour rights, trade union rights, social security, land use rights and water rights.	List of final, binding and unappealable decisions of an applicable judicial authority against the economic operator that remain unresolved.	?	?	++	++
	human rights	Respect human rights .	How is the Declaration of Human Rights addressed in the company?	Number of final, binding and unappealable decisions of the applicable judicial authority against the economic operator related to the violation of human rights that remain unresolved.	+/-	+/-	++	++
	labour rights	Respect labour rights .	How is the company dealing with forced or compulsory labour and child labour ?	Age and number of hours worked per child per week (Children means a child below the legal age of a child in the country. This does not apply to child labour on family farms or where it is permissible under applicable laws and then only when work does not interfere with the child's schooling and does not put his or her health at risk.) Number of hours worked per person per week in excess of applicable legal maximum.	?	?	++	++



Social criteria

- Labour rights:
 - Principle:** Respect labour rights
 - Criterion:** The economic operator provides information on how labour rights are addressed.
 - Indicators:** 1) Describe measures taken to safeguard rights related to trade unions and collective bargaining, forced and compulsory labour, child labour and discrimination.
- Conclusion: Fulfilment of this criterion mainly depends on the country and region of crop cultivation; currently, validated information is lacking about the situation of labour rights in the production of natural fibres in China and in Europe.



Social criteria

- Working conditions:
 - Principle:** Respect labour rights
 - Criterion:** The economic operator provides information on how working conditions are addressed.
 - Indicators:** 1) Describe policies and practices related to working conditions, including consideration of knowledge required, training, health, safety and hygiene.
- Conclusion: Labour rights in terms of working conditions are affected at different stages of the natural fibre value chain. Especially in developing countries, the use of pesticides may pose health risks to workers. Another concern in terms of working conditions is the practice of water retting (FAO 1998). Tambyrajah et al. 2012 state safety risks leading to mutilation in the processing stage, outdated technologies, dust contamination in the processing stage and potential allergic reactions. Several studies have examined the potential hazards of exposure of workers to respirable dust in natural fibre processing plants (Fishwick et al. 2001, Burdett and Bard 2006).



Social criteria

- Living conditions:
 - Principle:** Respect labour rights
 - Criterion:** The economic operator provides information about the living conditions of employees if these are living on site.
 - Indicators:** 1) Describe the living conditions and satisfaction of basic needs of the employees (e.g. access to drinking water, condition of housing, possibility for children to attend schools).
- Conclusion: Fulfilment of this criterion mainly depends on the country and region of crop cultivation; as such, the natural fibres coming from Asian countries may have more difficulties in fulfilling this criterion than European fibres.



Social criteria

- Land use rights and land use change:
 - Principle:** Respect labour rights
 - Criterion:** The economic operator provides information on how land use rights are addressed to gain free, prior and informed consent.
 - Indicators:**
 - 1) Describe the procedures taken for local stakeholder engagement to gain free, prior and informed consent, where traditional land use rights are applicable.
 - 2) Describe procedures taken to identify risks of direct effect on local food security.
 - 3) Document any direct effects and describe measures to reduce or avoid impact on local food security.
- Conclusion: Fulfilment of this criterion mainly depends on the country and region of crop cultivation; as such, the natural fibres coming from Asian countries may have more difficulties in fulfilling this criterion than European fibres.



Social criteria

- Water use rights:

Principle: Respect water use rights

Criterion: The economic operator in water-scarce areas provides information on how water availability for human consumption and food production are addressed.

Indicators:

- 1) Describe procedures taken to identify potential impacts on water resources within the affected local community, including the impact on water quality and quantity.
- 2) Describe the process to determine the affected local community.
- 3) List the potential impacts identified in 1).
- 4)

Describe measures taken to address the potential impacts listed under 3).

- Conclusion: Fulfilment of this criterion mainly depends on the country and region of crop cultivation; as such, the natural fibres coming from Asian countries may have more difficulties in fulfilling this criterion than European fibres.



Social criteria

- Local development:
 - Principle:** Promote local development
 - Criterion:** The economic operator provides information on how they promote local development.
 - Indicators:** 1) Describe activities to promote local development.
- Conclusion: Fulfilment of this criterion mainly depends on the country and region of crop cultivation; in general, the extent to which processors of natural fibres engage in activities to promote local development will largely depend on how much actors further down the value chain and especially end consumers will reward such activities.



Social aspects not covered by CEN-criteria

- **Rights of children, women and indigenous people:** On top of the CEN criteria, Tambyrajah et al. 2012 list rights of children, women, indigenous people against discrimination and combating poverty as areas of concern. Regarding child labour, a certain degree of involvement of children in the work of rural agricultural families in developing countries is very common, also in the cultivation and processing of natural fibres (Üllenberg et al. 2011).
- **Employment:** The CEN criteria do not address, how much employment is generated along the natural fibre value chain and where this employment is generated. Compared to synthetic fibres, natural fibres are very labour intensive, not only in the agricultural stage but also in the processing stage. As such, significant positive social impacts are generated by a natural fibre industry.



Economic criteria

- Fair business practices:

Principle: Produce and trade bio-based products in an economically and financially viable way.

Criterion: The economic operator provides information on how fraudulent, deceptive, or dishonest consumer or commercial business practice that is prohibited by applicable laws is addressed.

Indicators:

- 1) List of decisions of a judicial authority against the economic operator for fraudulent, deceptive, or dishonest consumer or commercial business practice.
- 2) Describe policies/practices related to fair business practices.
- 3) Keep records of risks identified in 2).
- 4) Present measures taken to reduce identified risks.

- Conclusion: Fulfilment of this criterion mainly depends on the country and region of crop cultivation. As such, the natural fibres coming from Asian countries may have more difficulties in fulfilling this criterion than European fibres.



Economic aspects not covered by CEN-criteria

- **Profitability:**
 - Very moderate development of world market prices natural fibres compared to other raw materials.
 - Strong competition by man- made fibres; challenges of irregular yields and qualities depending on the climatic and other environmental conditions of the season.
 - Particular markets where demand for natural fibres can be very strong (example of sisal fibres for construction in North Africa).
 - Jute benefitted from political measures aimed at supporting the natural fibres market, such as obligatory packaging with jute sacks in India, and also to new markets and applications that have been entered by natural fibres through new processing technologies, e.g. with technical short fibres in the automotive sector, agro- and geotextiles etc.
 - In general, more detailed comparative data on profitability are available for European fibres than for Asian fibres.



Economic aspects not covered by CEN-criteria

- **Lack of adapted varieties:**
 - Being minor crops, breeding activities and hence the availability of adapted varieties of fibre crops is lagging being major crops.
 - According to CRES et al. 2014, developing kenaf varieties suitable for high yields in Southern Europe is one of the challenges that kenaf is currently faces.
 - A lot of research in kenaf breeding China but the varieties currently cultivated in South Europe are imported mainly from USA and Mexico. Due to this lack of adapted varieties, kenaf can at the moment not be recommended as a fibre crop in Europe.
 - Increased breeding efforts should therefore have a significant effect on the economic sustainability of fibre crops.



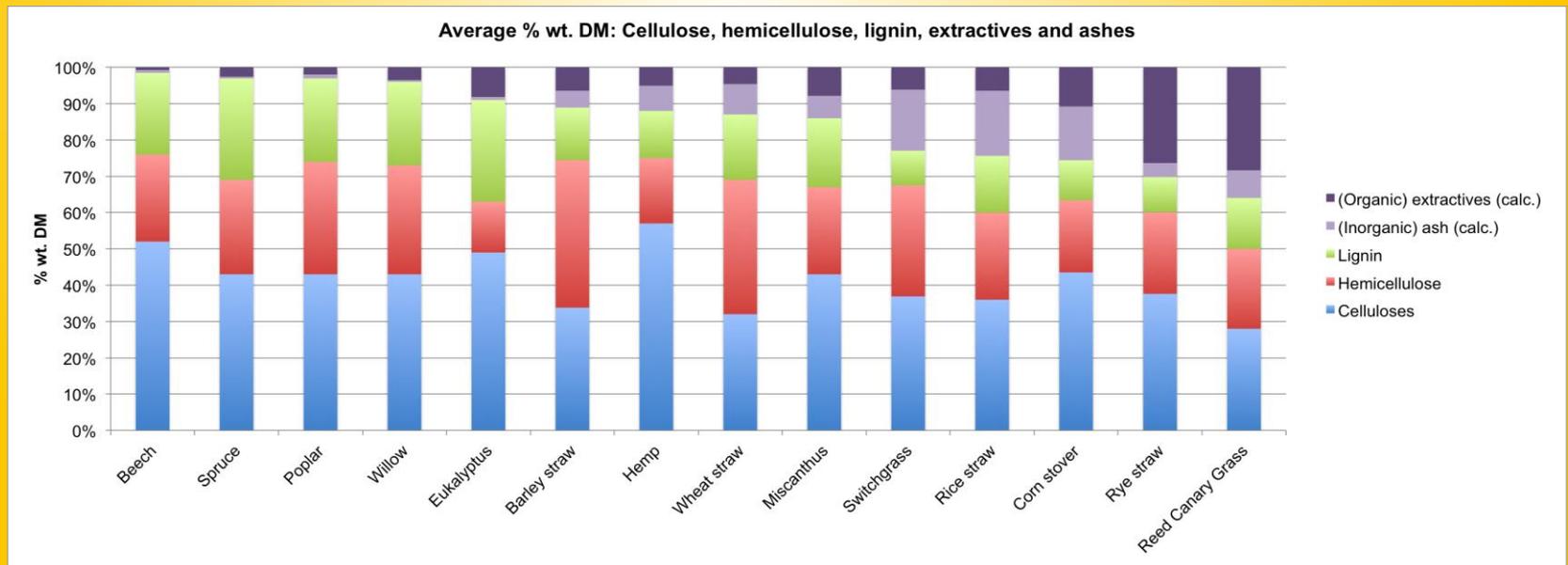
Economic aspects not covered by CEN-criteria

- **Input demand:**
 - **Nutrients:**
 - Higher nutrient demand of hemp compared to flax
 - No comparable data for kenaf and ramie
 - **Pest control:**
 - Hemp needs in most cases no pesticides due to its vigorous growth, shading capacity and disease resistance.
 - In flax, there is usually a need for an extensive weed management and diseases.
 - Also kenaf and ramie are affected by a whole range of pests, e.g. nematodes, but substantive information is missing.
 - **Water demand:**
 - According to Cosentino 2013, water requirements of flax are between 600-1000 mm while ramie requires at least 300 mm of water but with an optimum between 500-3000 mm per year.
 - According to Bocsa 2000, hemp requires 500-700 mm water.



Economic aspects not covered by CEN-criteria

- **Chemical composition:** Depending on the application, the chemical composition of natural fibre crops may also be a factor that influences economic performance. In the case of the use of natural fibre crops as a biorefinery feedstock, usually the components cellulose/hemicellulose and lignin can be valorized while the ash content constitutes a nuisance.





Conclusion and outlook

- The discussion of sustainability implications of natural fibre crops along the criteria of the draft CEN standard for the sustainability of bio-based products has shown that, first, substantive information for some of the criteria, especially the social criteria, is either missing or only describable for specific cases but not generalizable. Second, some important criteria are also missing in the CEN catalogue.
- The discussion of sustainability implications along the CEN standard only may therefore be insufficient and other standards, certification schemes and labels may have to be included.
- If possible, this will also include respective initiatives from China that could not yet be identified.