

Environmental assessment of sweet and biomass sorghum

Explanation and Purpose

The environmental assessment analysed the impacts of sweet and biomass sorghum cultivation and use as bioenergy crops. It covers the entire production chains of all considered SWEETFUEL scenarios in various settings. Sweet sorghum is mainly processed into ethanol. In the case of biomass sorghum, primarily biogas and biomethane production was considered but also alternative use options of the biomass, such as 2nd gen. ethanol, gasification or direct combustion. The assessment uses life cycle assessment (LCA) methodology (for implications e.g. on climate, acidification etc.) supplemented by a novel life cycle environmental impact assessment (LC-EIA), which covers local impacts. The objective was to identify the most promising pathways in environmental terms, to determine optimisation potentials and to compare the SWEETFUEL concept to conventional production chains.

Exploitation Strategy

The results were and will be presented on several national and international conferences and are going to be published in a detailed report on the SWEETFUEL homepage (Reinhardt et al.: Report on environmental assessment, 2014, www.sweetfuel-project.eu). Furthermore, the results strongly contribute to the integrated sustainability assessment of this project and to several other projects regarding the production of bioenergy from crops.

Further Research

Since there is a potential for optimising the production of bioenergy from sweet and biomass sorghum, further research is needed, amongst others, on breeding improved crop cultivars that aim at higher yields and a lower nutrient content in the harvested biomass to reduce the applied amount of mineral fertiliser per hectare.

Impact of Exploitation

Results of the environmental assessment may help stakeholders (politicians, scientists and researchers, industry, NGOs) to better understand the environmental implications of sweet and biomass sorghum cultivation and use, to realise potentials and to avoid associated risks.

Selected publications:

Köppen, S.: Sweet Sorghum first and second generation bioethanol – an environmental perspective. 6th International Conference on Biomass for Energy, Kyiv, 14 - 15 September 2010. Conference proceedings published on CD, to be ordered via <http://biomass.kiev.ua/en/en/conferences>, 2010

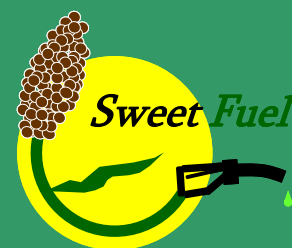
Rettenmaier, N.: Environmental implications associated with sweet sorghum production and use for biofuels. EUROCLIMA Workshop on the agro-environmental impact of biofuels and bioenergy (organised by JRC, UNICAMP & CTBE), Campinas, Brazil, 30 Nov –1 Dec 2011, http://re.jrc.ec.europa.eu/biof/pdf/euroclima_brazil/rettenmaier_sweet_sorghum.pdf, 2011

Reinhardt, G.: Environmental implications (LCA) associated with biofuels. Presentation at the international workshop "2G bioethanol production: technological development and agroenvironmental and economic implications". 18 April 2012, Bologna, Italy.

Reinhardt, G.: Environmental assessment of 1st and 2nd gen ethanol: an overview. In: Proceedings of the 20th International Symposium on Alcohol Fuels (ISAF) "Alcohol fuels enabling sustainable future development", www.isaf2013.co.za, 25-27 March 2013, Stellenbosch, South Africa, 2013

Reinhardt, G., Cornelius C.: Environmental assessment of energy sorghum. Proceedings of "22nd European Biomass Conference and Exhibition", Hamburg, Germany, 23-26 June 2014

Sweet Sorghum: an alternative energy crop



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