

PHYTOENERGY: Energetic Valorisation of Phytoremediation Derived Biomass

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There are presently more than 3 million contaminated sites all over EU, according to the EEA (report 25186 EN), with the contamination with heavy metals being of particular concern, as they are not degradable. Soil recovery is thus becoming an urgency and diverse approaches can be applied. From these, phytoremediation has shown to be an attractive low cost alternative as it promotes the establishment of a vegetation cover, stabilizing these degraded sites and allowing for the slow extraction of the contaminants. In spite that the fate of the harvested plants is a common complication for its implementation, it can also represent an opportunity for producing added value. This work intends to assess the possibility of the production of biodiesel resulting from the transesterification of sunflower seed oil with bioethanol resulting from the processing of sunflower stems. Sunflower plants growing either in agricultural and metal contaminated soils were assessed and the quality of the successive energetic products was evaluated.

Sunflower seeds were used for oil extraction, with observable extraction efficiencies of up to 20 ml oil/m²; plant stems were used for bioethanol production with yields of up to 280 ml/m²; finally, biodiesel was generated via transesterification. The final biodiesel as well as the obtained oil and bioethanol were characterized and it was possible to observe that the contamination of the soils with metals did not affect significantly the quality of the products, namely in concerning metal levels. This study reports thus the successful energetic valorisation of plants grown in degraded soils.