



Mineral concentrations in solid fuels from European semi-natural grasslands after hydrothermal conditioning and subsequent mechanical dehydration

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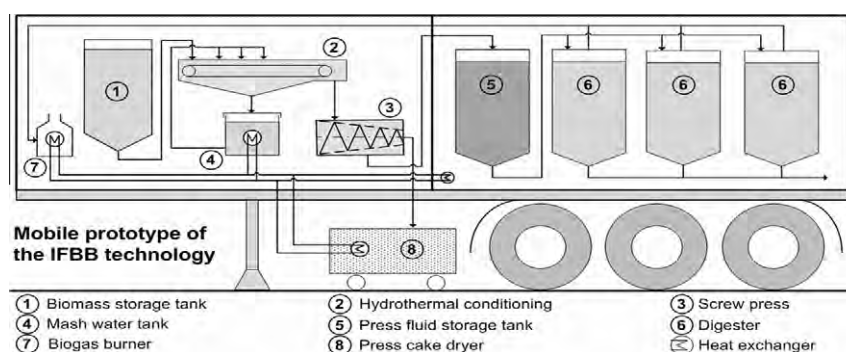
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HIGHLIGHTS

- ▶ Yield and chemical composition of grassland silage was investigated.
- ▶ Chemical composition of silage for combustion could be improved.
- ▶ Solid fuel quality was influenced by neutral detergent fibre content of the silage.
- ▶ High grass cover of the sward improves the chemical composition for combustion.

GRAPHICAL ABSTRACT



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ABSTRACT

The integrated generation of solid fuel and biogas from biomass (IFBB) is particularly designed for the conversion of semi-natural and high biodiversity grassland biomass into energy. This biomass is problematic in common energy conversion techniques, e.g. biogas conversion or combustion, because of its chemical composition. The IFBB process separates the material into a fibre rich solid fuel and a fluid, which is rich in minerals and highly digestible constituents and is used for anaerobic digestion. Biomasses from 18 European semi-natural grassland sites have been processed in an IFBB prototype. The impact of different chemical and botanical parameters on mass flow of mineral plant compounds and their concentrations in the fuel has been investigated. Fuel quality was significantly influenced by chemical and botanical parameters and the quality could be significantly improved during processing. Biomass with a high grass proportion and fibre content showed the best fuel qualities after IFBB treatment.

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1. Introduction

Semi-natural grasslands constitute a major part of the cultural landscape in Central Europe and harbour a vast diversity of plant and animal species. This diversity is threatened by intensification and abandonment (Isselstein et al., 2005). The conservation of these grasslands is therefore one of the main goals of European nature conservation policy. Regular cut of semi-natural grassland is necessary to conserve the current plant inventory, but is often

Abbreviations: ADF, acid detergent fibre; ADL, acid detergent lignin; a.s.l., above sea level; AST, ash softening temperature; CEC, cation exchange capacity; CF, crude fibre; DE, Germany; DM, dry matter; EE, Estonia; IFBB, integrated generation of solid fuel and biogas from biomass; ICP-OES, inductively coupled plasma-optical emission spectroscopy; NDF, neutral detergent fibre; NFE, nitrogen free extract; MF, mass flow; PF, press fluid; PC, Press cake; UK, United Kingdom; WRB, World Reference Base for Soil Resources; XA, crude ash; XP, crude protein.

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