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## Evaluation of the Bio-Methane Potential of By-Products from Cassava Starch Processing

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### Abstract

Aim of the present study is to examine the bio-methane potential of cassava root peels and cassava pulp. The study especially focusses on trace elements essential for bacteria involved in bio-methane production process. Cassava peels from Tanzania and cassava pulp obtained from fresh cassava purchased from a local distributor in Stuttgart, Germany, were analysed regarding the content of Co, Mo, Ni, Se, Fe and Mn. Extended Weender analysis was conducted to investigate on the amount of degradable and less degradable fractions in the chosen substrates. C/N ratio as an indicator for substrate quality in terms of conditions required by methanogenic bacteria was determined. Expectable bio-methane yield was determined based on Hohenheim Biogas Yield Test (HBT) following standard VDI 4630.

Results showed a lignin content of 10% dry matter basis for peels and 0.3% dry matter basis for cassava pulp. Detected C/N ratios were within a suitable range for bio-methane bacteria but contents of essential trace elements in general are lower than the concentration recommended in literature for practical applications. HBT shows a total biogas potential of 0.443 m<sup>3</sup> N kg<sup>-1</sup> DM for cassava root peels and 0.450 m<sup>3</sup> N kg<sup>-1</sup> DM for cassava pulp resulting in a bio-methane yield of 0.225 m<sup>3</sup> N kg<sup>-1</sup> DM for peels and 0.224 m<sup>3</sup> N kg<sup>-1</sup> DM for pulp, respectively.

The study shows the necessity for adding essential trace elements for establishing a stable bio-methane process if cassava by-products are utilised. This can be realised by using mixtures of cassava products and animal manure. Results further indicate that investigated by-products of cassava starch processing have an utilisable bio-methane potential, which can contribute to an environmentally friendly energy supply of the cassava starch processing industry and prevent pollution caused by uncontrolled dumping.

**Keywords:** Bio-methane potential, cassava by-products, cassava starch processing, trace elements