Effect of hydrothermal carbonization in feedstocks and digestates of manure and maize from contaminated land – A pre-analysis of metal up-concentrations in digestates

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INTRODUCTION

- The VeDoWS system is a stable construction that aims for separated collection of pig urine and faeces. This system can reduce GHG emissions and produce higher biogas and CH_4 yields, since only the separated solid fraction is used as feedstock.
- Higher up-concentrations of heavy metals (HMs) in digestates are expected when using the solid fraction of manure as feedstock for biogas production.
- The hydrothermal process (HTC) occurs at 160-250 °C and pressures from 2 to 10 Mpa. The resulting in hydrochars have the potential to be used as bio-based fertilisers, as they might have a reduced HMs bioavailability and improved fuel properties compared to the untreated manure and digestates

OBJECTIVES

1) Analyze metal up-concentrations in digestates from mono-digestion of the solid fraction of manure (VeDoWS system) and its co-digestion with maize from contaminated land.

Fig 1. VeDoWS system (NUTRIMAN, 2021)

2) Comparing Cu and Zn concentrations between the digestates and hydrochars produced according to the Product Function Categorie 1A (PCF 1A) of Fertilizer Regulation (2019 / 1009) (EC, 2019).

METHODOLOGY

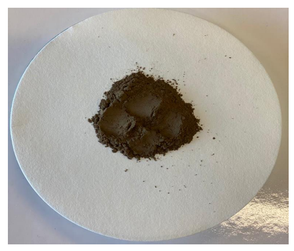
Feedstock / Inoculum

Feedstocks (Manure - VeDoWS system / contaminated maize)

Semi-continuos reactors (i / ii)

Hydrochar

Final co-digestate sample



Final mono-digestate sample

Digestates samples

- **D-1-i / D-2-i: 1st sampling of mono-digestate / co-digestate**
- **D-1-ii / D-2-iii: 2nd sampling of mono-digestate / co-digestate**
- **D-1-iii / D-2-iii: 3rd sampling of mono-digestate / co-digestate**
- **D-1-iv / D-2-iv: Final sampling mono-digestate / co-digestate**

RESULTS

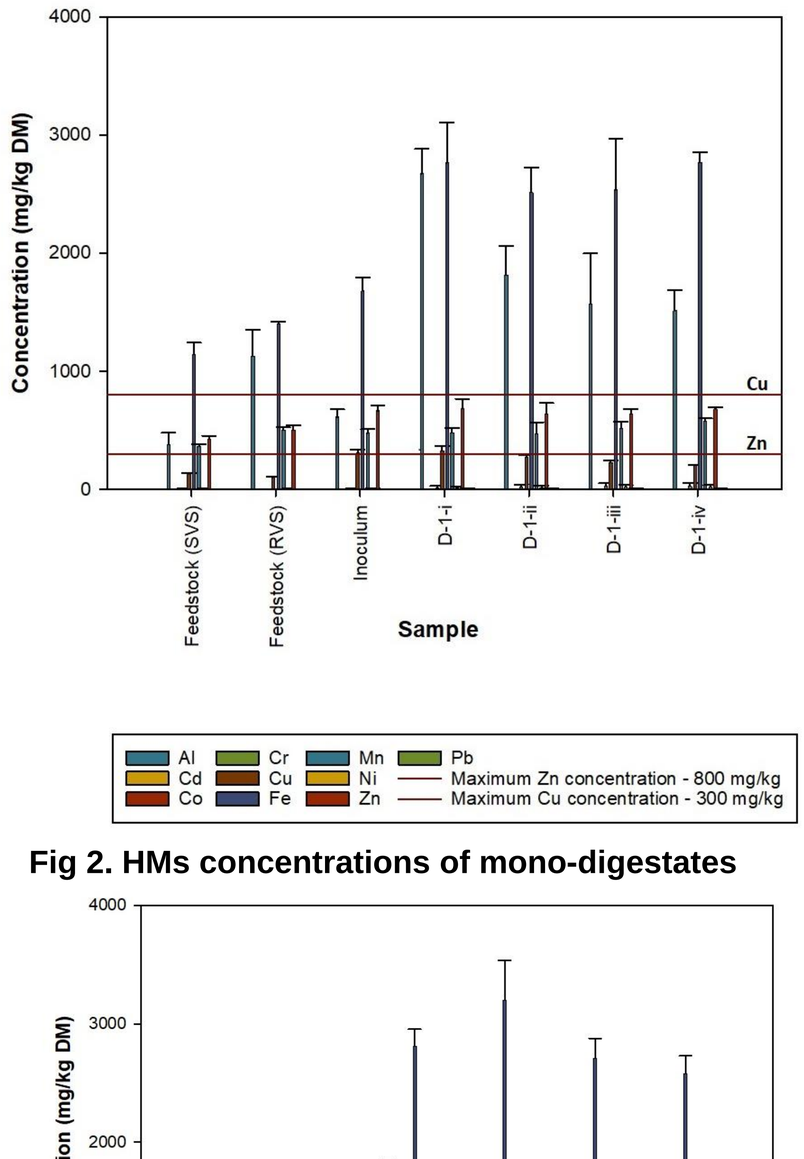


Fig 2. HMs concentrations of mono-digestates

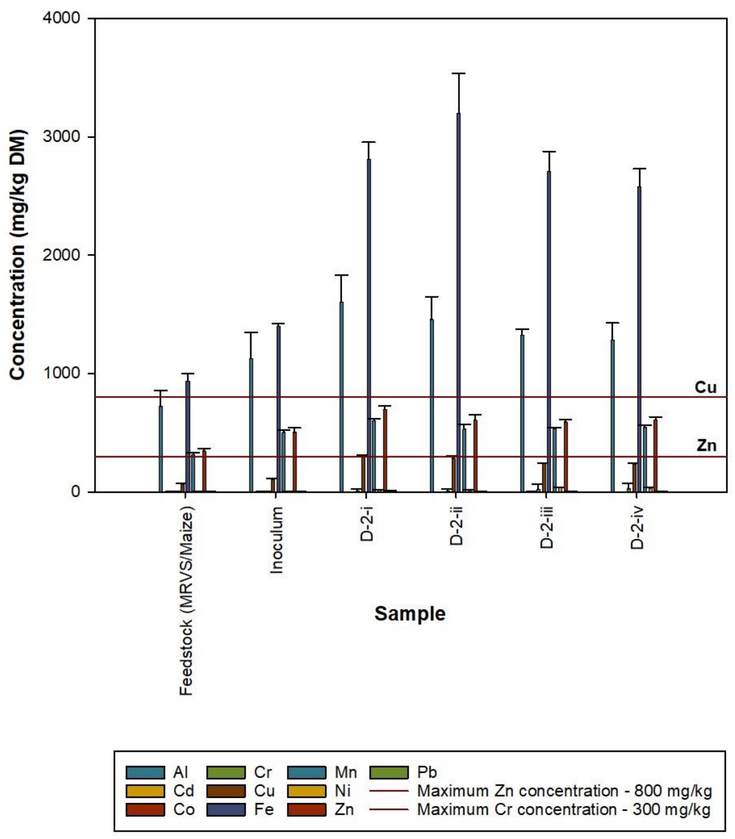


Fig 3. HMs concentrations of co-digestates

CONCLUSIONS

The Cu concentrations of 1st sampling in digestates exceeded the threshold value according to the Fertilizer Regulation (2019 / 1009). The following steps will include the hydrothermal treatment in digestates and compare the HMs bioavailability with the untreated digestates and feedstocks. Furthermore, plant growth experiments will be perform to analyze plant-soil effect on the HMs bioavailability. The suitable end-products will be selected according to the legislation.

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