Optimization of nutrient fluxes in European agriculture by using bio-based mineral fertilizer substitutes: a field experiment

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INTRODUCTION

• Several regions in Europe such as Flanders (Belgium) are confronted with manure surplus as a consequence of intensive livestock production. These regions are obliged to process and export the manure surplus.

• In contrast, European agriculture is faced with an increasing demand for synthetic fertilizers. The solution for the existing paradox can be found in a sustainable resource management which is in line with the cradle-to-cradle approach: waste should be turned into secondary resources.

• With the goal to use bio-digestion derivatives as a substitute for mineral fertilizers, several field trials were conducted within the projects INTERREG IV - ARBOR (Accelerating Renewable Energies through Valorization of Biogenic Organic Raw Material) and MIP – NutriCycle (Green fertilizer from digestate and manure).

• A first field trial was conducted in Wingene. No statistical differences could be identified when comparing classic fertilisation versus green fertilizers with respect to crop yield, soil fertility and quality.

• In order to validate the results and evaluate the impact on soil quality in the longer term, these field trials were continued in the following years (2012 – 2013).

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EXPERIMENTAL SETUP 2013

• In 2013, field trials were conducted on two different locations in Belgium: Wingene (sandy soil) and Roeselare (sandy-loam soil).

• In total, on both fields, eleven different fertilization treatments (n=4) were applied.

• Conventional fertilization regime (manure + artificial fertilizers) served as a reference = Scenario 1.

CROP YIELD RESULTS 2013

• On both locations, no statistical differences were observed when comparing classic fertilization versus green fertilizers with respect to crop yield.

• In Wingene (sandy), scenario eight with complete substitution of artificial fertilizers by air scrubber water and LF digestate, showed a slightly higher yield as compared to the reference scenario.

• In Roeselare (sandy loam), scenarios with complete substitution of artificial fertilizers have shown the tendency to have equal or slightly higher yield as compared to the reference.

• Compilation of the results from the three-year trial will contribute significantly in evaluating bio-digestion derivatives as a nutrient source.

• In March 2014, a new field assessment will be conducted. In this trial, a wider range of bio-digestion derivatives, such as evaporated effluent from biological treatment, will be tested on cauliflower.

CONTRIBUTION TO THE TRANSITION FROM FOSSIL TO BIO-BASED ECONOMY AS A CATALYST FOR RECOGNITION OF GREEN FERTILIZERS WITHIN THE EUROPEAN LEGISLATION