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PRACTICE ABSTRACT

REGIONAL BBF LCA

Final Life Cycle Assessment (LCA) report

SHORT SUMMARY FOR PRACTITIONERS

EN version

The Life Cycle Assessment (LCA) analysis was performed by evaluating the environmental performance of RUSTICA bio-based fertiliser (RBBF) over its life cycle (from waste collection and processing, RBBF production to field application), and comparing this performance with the reference scenario, which was individually defined for each RUSTICA region, that includes: Flanders (Belgium), Pays de la Loire (France), Almeria (Spain), Friuli-Venezia Giulia (Italy) and Valle del Cauca (Colombia). Based on the specific RBBF formulated for each region, and with the help of regional stakeholders, potential value chains and business model scenarios were defined for the project. These business models served as the basis for the formulation of regional product systems incorporating various technologies that result in the production of several fertiliser ingredients (microbial biomass, insect biomass, insect frass, nutrient concentrate, biochar, compost) utilised for RBBF formulation, each of which having own specific characteristics and composition that is linked to the regional inputs from which they are produced. Furthermore, RBBFs production (including blending of fertiliser ingredients), logistics, application of the fertiliser and any related field operations and emissions directly after fertiliser application in the field were also taken into account.

SHORT SUMMARY FOR PRACTITIONERS

NATIVE version

The Life Cycle Assessment (LCA) analysis was performed by evaluating the environmental performance of RUSTICA bio-based fertiliser (RBBF) over its life cycle (from waste collection and processing, RBBF production to field application), and comparing this performance with the reference scenario, which was individually defined for each RUSTICA region, that includes: Flanders (Belgium), Pays de la Loire (France), Almeria (Spain), Friuli-Venezia Giulia (Italy) and Valle del Cauca (Colombia). Based on the specific RBBF formulated for each region, and with the help of regional stakeholders, potential value chains and business model scenarios were defined for the project. These business models served as the basis for the formulation of regional product systems incorporating various technologies that result in the production of several fertiliser ingredients (microbial biomass, insect biomass, insect frass, nutrient concentrate, biochar, compost) utilised for RBBF formulation, each of which having own specific characteristics and composition that is linked to the regional inputs from which they are produced. Furthermore, RBBFs production (including blending of fertiliser ingredients), logistics, application of the fertiliser and any related field operations and emissions directly after fertiliser application in the field were also taken into account.

RUSTICA

Demonstration of circular bio-based fertilisers and implementation of optimized fertiliser strategies and value chains in rural communities

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N. 101000527

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CONTEXT

Due to their very specific composition and general, low-cost availability, mineral fertilisers have been dominant in agriculture practices for decades, which has brought a range of serious ecological effects, such as contribution to climate change through CO_2 and N_2O emissions, eutrophication, decline in organic matter soil content, release of heavy metals into ecosystems, etc. Also, the production of mineral fertilisers can be highly energy demanding and it is usually based on fossil fuels and other non-renewable resources.

PROBLEM

The RBBF products are intended to provide agriculture with the same functional benefits as mineral fertilisers but sourced from locally available fruit and vegetable waste streams. It is expected that the substitution of mineral fertilisers with circular and bio-based alternatives can lead to environmental savings, which was determined and, whenever possible, quantified through LCA.

APPROACH

LCA was performed in a comparative way, which means that within a specified set of criteria, one product (in this case the RBBF life cycle) is compared to another representing the business-as-usual (individually defined for each RUSTICA region in the field experiments), from the environmental perspective and on a regional level.

OUTCOME

1. In most cases RBBFs perform environmentally much better than the reference per 1 tonne of fertiliser (apart when the reference is compost and manure).
2. The results vary from one region to another once the field application and crop production are also considered.
3. Normally, RBBFs demonstrate better, or at least comparable environmental performance than mineral and organo-mineral fertilisers.
4. The comparison of RBBFs with other organic fertilisers depends on the region and the type of fertiliser used.
5. RBBFs performed better than cattle and dried-poultry manure in Italy and France, but worse than compost and semi-dried sheep manure in Spain.

PRACTICAL RECOMMENDATIONS

- ✓ There is a substantial difference in application rates (can be up to 35 times more for RBBF than the mineral fertiliser), which has a major impact on the fertilisation environmental performance per 1 tonne of crop per ha.
- ✓ The RBBF performs much better than the mineral fertiliser if the difference in application rates was less than 10.
- ✓ If the difference in application rate was more than 10, the RBBF usually performed better than the mineral fertiliser only in some environmental impact categories

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