



REGIONAL BBF COST ANALYSIS

Final Life Cycle Costing (LCC) report

SHORT SUMMARY FOR PRACTITIONERS

EN version

The Life Cycle Costing (LCC) analysis was conducted of the full RUSTICA concept, including the integrated fruit and vegetable nutrient recovery value chains developed in the context of 5 RUSTICA regions: Flanders, Pays de la Loire, Almeria, Friuli-Venezia Giulia and Valle del Cauca (Colombia). RUSTICA concept incorporates various technologies for the production of several fertiliser ingredients (microbial biomass, insect biomass, insect frass, nutrient concentrate, biochar, compost), each of which having own specific characteristics and composition that is linked to the regional inputs from which they are produced. These different ingredients are applied as specific RUSTICA Bio-Based Fertiliser (RBBF) blends formulated to match the current and future crop needs on a regional (or inter-regional) level, as defined by the regional multi-actor networks in 5 RUSTICA regions.

The economic performance of RBBF over its life cycle (from waste collection and processing, RBBF production to field application) were assessed and compared with the reference scenario, which was individually defined for each RUSTICA region. Furthermore, RBBFs logistics and any costs related to field operations were also taken into account. Finally, the LCC study concerned both the internal costs (economic) and other external relevant costs (environmental and social) calculated from the results of the LCA studies.

SHORT SUMMARY FOR PRACTITIONERS

NATIVE version

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CONTEXT

Mineral fertilisers are known from low-cost availability, but also from multiple serious ecological effects. It is expected that the substitution of mineral fertilisers with circular and bio-based alternatives can lead not only to environmental savings (e.g. reduced GHGs emissions, reduced emissions to air and water, improved soil quality or reduced soil contaminants), but also to economic sustainability. If both the environmental and economic criteria were fulfilled, there would be a chance for replacement of mineral fertilisers with their bio-based counterparts.

PROBLEM

To understand the economic performance of RBBF products throughout their life cycle (from production to their use), determine the hot-spots and identify opportunities for cost improvements.

APPROACH

LCC 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 economic perspective and on a regional level.

OUTCOME

1. Currently RBBFs are not economically competitive with mineral fertilisers and selected organo-mineral and organic fertilisers considering the current market conditions
2. Although the price per tonne of fertilisers in most cases was lower for RBBF than the reference (except for other organic fertilisers, such as manure and compost), there is a substantial difference in application rates (even up to 35 times more of RBBF than the reference in some instances), which has a major impact on the fertilisation cost per 1 tonne of crop per ha.
3. The comparison looks more promising once environmental costs are included (especially in Spain, Italy and Colombia) but the cost of RBBF is still slightly higher than the reference fertilisers.

PRACTICAL RECOMMENDATIONS

- ✓ RBBFs can become more competitive once or if mineral fertiliser prices increase in the future, and at the same time the cost of fertiliser ingredients of RBBF declines.
- ✓ Due to relatively low Technology Readiness Level (TRL), most RUSTICA technologies have room for further improvement and cost optimisation.
- ✓ A stable, high-volume and relatively cheap source of biomass could be found for scaling-up production of RBBFs
- ✓ Formulation of biomass cascades demonstrated a potential for reducing the production of some RBBF ingredients (e.g. microbial proteins), which would otherwise be very expensive.
- ✓ Some regionally-available alternative waste processing technologies could effectively replace RUSTICA technologies that are considered expensive.