



CHARACTERISATION RUSTICA BUILDING BLOCKS

Preliminary report on lab-scale fertiliser ingredient characterisation

SHORT SUMMARY FOR PRACTITIONERS

EN version

RUSTICA's core: Looking for a technical solution to convert organic fruit and vegetables residues into novel RUSTICA bio-based fertilisers (RBBFs) that address the needs of modern (organic) agriculture: economically viable and environmentally sustainable alternatives to mineral fertilisers. Modern agriculture will become increasingly nature-, climate- and soil-inclusive. RBBF ambitions to contribute to

- CO₂ capture
- Lower nitrate and greenhouse gas emissions
- Erosion control
- Improved water retention
- More climate resilient agriculture
- Increasing soil biodiversity; beneficial for soil and crop resistance.

Five technologies deliver the building blocks, microbial biomass, mineral nutrient concentrates, insect biomass, insect frass, insect chitin and biochar will be combined to realise regional customer wish for RBBF functionalities concerning crop performance, soil quality and societal services. The building blocks will be analysed for their composition and characteristics and categorised for hypothetical agricultural and environmental value (nutritional, plant protection, soil quality). The fertiliser components will be characterised for the following parameters: humidity, ashes, organic matter content, pH, conductivity, total organic C, total N, water soluble C and N, NO₃⁻, NH₄⁺, P₂O₅, Fe Ca, Mg, micronutrients and other relevant parameters.

SHORT SUMMARY FOR PRACTITIONERS

NATIVE version

De kern van RUSTICA: Op zoek naar een technische oplossing om groente- en fruit afvalstromen om te zetten in nieuwe RUSTICA biogebaseerde meststoffen (RBBFs) die voldoen aan de behoeften van de moderne (biologische) landbouw: economisch levensvatbare en ecologisch duurzame alternatieven voor minerale meststoffen. De moderne landbouw wordt steeds meer natuur-, klimaat- en bodeminclusief. RBBF ambieert om hieraan bij te dragen:

- CO₂ vastlegging
- Lagere uitstoot van nitraat en broeikasgassen
- Erosie controle
- Verbeterde waterretentie
- Meer klimaatbestendige landbouw
- Verhogen van de bodembiodiversiteit; gunstig voor bodem- en gewasweerbaarheid.

Vijf technologieën leveren de bouwstenen, microbiële biomassa, minerale nutriëntenconcentraten, insectenbiomassa, insectenfrass, insectenchitine en biochar worden gecombineerd om de regionale klantwens voor RBBF-functionaliteiten op het gebied van gewasprestatie, bodemkwaliteit en maatschappelijke dienstverlening te realiseren. De bouwstenen worden geanalyseerd op hun samenstelling en eigenschappen, en gecategoriseerd op hypothetische landbouw- en milieuwaarde (voedingswaarde, gewasbescherming, bodemkwaliteit). De componenten van de meststof worden gekarakteriseerd op de volgende parameters: vochtigheid, as, organische stofgehalte, pH, geleidbaarheid, totaal organische C, totaal N, wateroplosbare C en N, NO₃⁻, NH₄⁺, P₂O₅, Fe, Ca, Mg, micronutriënten en andere relevante parameters.



CHARACTERISATION RUSTICA BUILDING BLOCKS

Preliminary report on lab-scale fertiliser ingredient characterisation

CONTEXT

RUSTICA's ambition to develop regionally based circular plant-based fertilisers depends technologically on the characteristics of the chosen building blocks and their synergistic effects. Some regions have stated in advance that not all building blocks will be available: an additional challenge.

PROBLEM

- Chemical characterisation of the building blocks for their agronomic value in the broad sense.
- To evaluate the characterisation for their feedstock dependency.
- Provisional ranking of the building blocks according to their nutritional value, contribution to biological activity and build-up of physical soil parameters

APPROACH

Each of the 5 technologies has used 5 or more different types of feedstock to produce their building blocks. The chemical and biological characterisation of all these building blocks should show what influence the type of feedstock has on the relevant building block. Furthermore, there is a search for where the building blocks complement each other functionally.

OUTCOME

1. RUSTICA has chosen a set of promising building blocks to produce local blends RBBF
2. The building blocks complement each other nicely concerning biodegradability of organic matter, direct plant available mineral nutrients, CEC etc.
3. The effect of different kinds of feedstock is as yet insufficiently studied
4. Up to now the capacity to produce the building block is firmly limiting, except for compost.

PRACTICAL RECOMMENDATIONS

- Be aware: the properties of the building blocks cannot simply be added together; there are undoubtedly synergistic interactions
- The relevance of the variations in the characteristics of a building block should be evaluated; in addition to factors such as economics and upscaling, the precision of the final administration is also important.

	Soil organic matter content (SOM)			Mineral availability	Activation of bioactivity
	Easy	Medium	Recalcitrant		
Biochar		+	++	-	-
Mineral concentrate	-	-		+	-
Microbial biomass	+/-	-	-	-	+
Insect frass	+	+/-		+/-	+
Insect biomass /chitin	+	+/-		+/-	+
Compost	++	+		+	+

Effects of the RUSTICA building blocks on soil properties (personal communication).

- Easy: biodegradable within 2 years;
- Medium: biodegradable 2 > years > 5;
- Recalcitrant: biodegradable >5 years