

# Increasing Bio fertilisers usage for a sustainable agriculture at less cost

## Innovation in sustainable agriculture

Mineral fertilizers, also known as chemical fertilizers, are not fully built on natural materials and may contain harmful elements. Although they play an important role on increasing soil fertility and crop productivity in conventional farming, its long-term excessive use has contributed to reduce soil organic matter content and contaminations, with a consequent decline in the agricultural soil quality, and even an increase in soil acidification and environment pollution. Therefore, rapid change from chemical fertilizers into biobased circular economy is needed, which transition is supported by the new EU Circular Economy, Green Deal and Fertilising Products Regulation, implemented from July 16, 2022.

There is urgent need for innovative fertilising products, containing nutrients and organic matter recycled from by-products or other secondary raw materials in line with the circular economy model.

It is important to improve the currently used Nitrogen and Phosphorus recovery systems, namely the upcycling of unexploited agricultural and food industrial by-product streams by advanced recovery processing solutions and transform biomass into safe, efficient and market competitive bio-fertiliser products at less cost.

## New results and services for Europe and beyond

This unique cluster and Nitrogen and Phosphorus recovery thematic network of several “ready for practice” and “close to market” status industrial projects focused on converting unexploited biomass into different types of bio-fertiliser and soil improver products, as well as bringing these innovative techniques into the market as full commercial applications.

### BioPhosphate and biochar products

1. Food grade animal bone biomass origin bio-fertiliser product;
2. Bio-Phosphate contains economically high amount of Phosphorus (35% P2O5) and Calcium (37%) with macro-porous structure, which is processed and formulated to be available for plants, which allows efficient, environmentally safe and renewable phosphorus supply;
3. Functionality of solid organic fertilizer and/or organic soil improver;
4. Economical high nutrient density and gradual solubility, improving soil nutrient content and water retention capacity, safe to use, economic, legal compliance;
5. Fully safe and economical innovative fertilizer with primarily application in the horticultural organic/low input farming cultivations with combined beneficial and multiple effects;
6. Full compliancy with the EU, UK, US, Australian and Japanese market addressed regulations, industrial – environmental – climate protection norms and standards.

### 3R Recycle-Recover-Reuse zero emission pyrolysis technology for phosphorus and biochar recovery

1. Original solution and large scale industrial design for economical “3R” Recycle, Recover and Reuse of organic by-products and waste streams with focus on cheapening the value chain, while targeting elimination of contamination from food chain and improvement of food safety for less cost;
2. Highly advanced 3R zero emission innovative pyrolysis technology and reductive thermal processing with large scale surplus green electricity production performance;
3. Efficient carbon refinery of animal and/or plant origin unexploited biomass by-product streams into BioPhosphate and Terra Preta biochar products;
4. Standardized, advanced, and comprehensive bio-waste treatment and nutrient recovery process;
5. Ready for manufacturing and for full industrial production replication model commercial implementation at TRL9 with 20,800 tons/year throughput capacity scale;
6. Full compliancy with the EU, UK, US, Australian and Japanese market addressed regulations, industrial – environmental – climate protection norms and standards;

Technology Readiness Level: Level 8, commercial implementation of breakthrough, evidence-based and innovative technology. The 3R solution and BioPhosphate products are demonstrating sustainable growth of the business to deliver multiple impacts through a promising and realistic business planning, and a significant growth potential at a relatively modest capital investment, with a realistic exit strategy capable of supporting financial and non-financial returns. All 3R phosphorus and biochar recovery solutions and product applications are supported with high impact and advanced thematic knowledge transfer, training and education actions.



## Reducing mineral fertilisers and chemicals use in agriculture by recycling treated organic waste as compost and bio-char products (2011-2015)

# Who benefits?

From Agriculture, Industrial Engineering & Technology sectors, the following profiles:

1. Large agricultural and industrial Enterprises for 3R technology adaptations for production and applications of bio-fertilizer and water treatment adsorbents.
2. Small and Medium Enterprises for 3R technology adaptations for production and applications of bio-fertilizer and water treatment adsorbents.
3. Financial investors: the 3R solution and BioPhosphate products are demonstrating sustainable growth of the business to deliver impact through a promising and realistic business planning, and a significant growth potential at a relatively modest capital investment, with a realistic exit strategy capable of supporting financial and non-financial returns.
4. EU & national policy makers, Funding Agencies including digital agencies.
5. All stakeholders and win-win actors in the targets value chains.
6. Ultimate benefits are targeted most importantly at the end, the Consumers.

# The impact on the future of sustainable agriculture

1. Significantly decreasing the cost of the unexploited biomass upcycling/valorisation processing/conversion and commercial application of the innovative biobased fertiliser products as defined in the EU 2019/1009;
2. Improvement of food, environmental and climate safety;
3. Significant enhancement of environmental, ecological and economical sustainability of food crop production;
4. Contribution to climate change mitigation & to the development of the circular bio-economy;
5. Reduction of the usage of mineral fertilisers and chemicals in agriculture, by recycling and reusing of treated organic waste;
6. Development of new standards, quality and safety criteria for Fertilising Product Regulation EU 2019/1009.



## GET TO KNOW REFERTIL AND NUTRIMAN PROJECTS

This cluster of projects reduces of mineral and chemical fertilisers in agriculture by upcycling treated organic by-products and waste streams. Improve your bio-waste transformation and nutrient recovery treatment processes for production of wide range combined natural products for organic and low input farming applications. Contact: Edward Someus [biochar@3Ragroc carbon.com](mailto:biochar@3Ragroc carbon.com)

Reducing mineral fertilisers and chemicals use in agriculture by recycling treated organic waste as compost and bio-char products (2011-2015)



[www.biophosphate.net](http://www.biophosphate.net)

<https://biophosphate.net>

<https://youtu.be/02tikiRUxs0>

[https://nutrیمان.net/farmer-platform/product/id\\_192](https://nutrیمان.net/farmer-platform/product/id_192)

Nitrogen and Phosphorus recovery thematic network to compile knowledge of "ready-for-practice" recovered bio-based fertilizer technologies, products, applications and practices for the interest and benefit of agricultural practitioners (2018-2031).



[www.nutrیمان.net](http://www.nutrیمان.net)

<https://nutrیمان.net>

[https://youtu.be/-b\\_64YfpCRA](https://youtu.be/-b_64YfpCRA)

<https://www.facebook.com/Nutrیمان.net/>



REFERTIL project have received funding from the European Union's Seventh Framework Programme under Grant Agreement number 289785. NUTRIMAN has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement No 818470.

