DEASPHOR – Design of a product for substitution of phosphate rocks

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Background

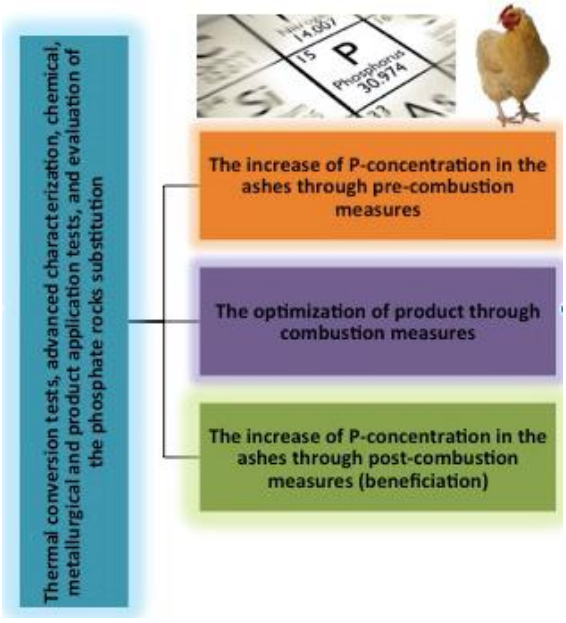
Phosphate rock production (included in the list of critical raw materials for the EU) is abundant but finite, and controlled by few countries with Morocco and Western Sahara controlling 77% of the reserves. To complicate, there are no substitutes for phosphorus as a plant nutrient, and no P-recycling is being made. Therefore to prevent a sustainable P supply, and food in a world growing population, one option is to reduce demand of phosphorus, and the other is P-recycling from primary sources (e.g. manure). Aviary litter is the richest-P manure, but its direct utilization "burns" plants since it has eight times more P than plants need. However, the incineration of aviary litter concentrates P and generates ash that is a readily available and huge P-source.

Objectives

The global objective of this project is the recycling of phosphorus from poultry litter ash to be used as a substituting material of phosphate rocks.

Methodologies

DEASPHOR project considers a multidisciplinary approach in collaboration with industry. Therefore, it is composed of a set of complementary and subsidiary research teams. For what concerns Ario's work, it provides for sampling using mostly rice husk as aviary bed; then regarding characterization, the poultry litter ash should be characterized in terms of basic and advanced techniques (e.g. XRD, Raman, XPS, SEM/EDS, EMPA). The results obtained will be used to understand the P-partitioning and materials formed, and provide the information to optimize the product and its applications, and the efficiency of the P-extraction. Finally, regarding the product evaluation, the evaluation of the phosphate rocks substitution will be based on embodied energy and the CO_2 footprint parameters.



Expected Results and Impact

The use of ash waste as a substituting material of critical raw material is an essential part of increasing resource efficiency and closing the loop in a circular economy. This will contribute to turn one industry's by-product into another industry's critical raw material. As consequence, it will improve EU competitiveness through development of industrial technologies related to the recycling of substitutes of phosphate rock, finally resulting in the creation of technological knowledge, value, economic reinforcement, specialized skills development and jobs, pushing EU to the forefront in P-recycling.