**Description:**

The excessive use of fertilizers and livestock manure have contributed in recent decades to generate a pollution process to water bodies known as eutrophication. The main causes are the uncontrolled input of nutrients, manly nitrogen (N) and phosphorus (P) coming from soil water-leaching and/or soil water-run-off. Anaerobic digestion (AD) has been reported to modify chemical-physical properties of slurries, so that P removing can be enhanced a lot.

According to these priorities POWER project aims to develop techniques able to remove P from digested animal slurries by precipitation of P as salt (struvite), producing renewable fertilizers. The effect of P removal on water pollution and environmental impacts will be considered as well.

**Objectives:**

The POWER project aims to develop a useful system to recover phosphorous from animal slurry by AD pre-treatment, with the double goals to reduce soil and water P-pollution, and to recovery two renewable fertilizers: 1. organic-mineral fertilizer (solid stabilized separate fraction of digestate) and 2. mineral fertilizer - “struvite” -, by successive treatment of the liquid fraction of digestate. Moreover POWER project has the objective to better understand the fate of P fertilizers in soil and the potential of pollution, i.e. P-form vs. P leaching and/or P-run-off.

**Strategy**

The project consist in 5 WP. WP1 investigates the effect of AD on P-form (chemical and spectroscopic techniques) with reference in producing a solid fraction representing an organ-mineral-P fertilizer. WP2 is devoted to removing residual P form from the liquid digested fraction by optimizing P salt precipitation, i.e. struvite. (mineral P fertilizer). Lab-scale trials, varying process parameters and using different co-reagent, will outline optimal combination to remove until 90% of total P-slurry. WP3 is devote to test P-fertilizers obtained by both chemical and vegetative tests. In addition P speciation in soil treated with P-fertilizers produced, will be compared to with soil that received excesses of P by animal slurries in order to rank pollution potentiality. WP4 will devoted to detect the effect of P removal on water pollution and environmental impacts by LCA methodology. In the last WP5 is dedicated to the dissemination of results.

**Results**

The expected results are as in the following:

- to develop efficient and cost effective system able to remove phosphorus from animal slurry by using the anaerobic digestion;

- improve the management of digestate avoiding overload of phosphorus in the soil and subsequent transport in surface water bodies and consequent eutrophication;

- provide an alternative to minerals phosphate fertilizers, currently produced from non-renewable resources (phosphate rock) nearing depletion.

- To rank environmental benefit coming from P reduction in slurry producing P renewable fertilizers by Life Cycle Analysis (LCA) .