

# Development of a technology of innovative microbiologically enriched mineral fertilizers (BIO-FERTIL)

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Without innovative and environmentally friendly technologies, modern agriculture, especially crop production, will be inadequate to feed the growing population in the face of the progressive degradation of agricultural soils. It is estimated that 89% of the soils in Poland are of low and very low fertility, including more than 60% of soils with a pH below 5.5, while in other EU countries over 30% of arable soils are degraded. Most of agricultural soils in Poland and the EU are low in organic matter. In this context, it is vital to search for environmentally friendly methods of increasing the organic matter and humus content in agricultural soils, which will increase their biological activity, water content and sorption capacity, and improve the soil structure and gas exchange between the soil and atmosphere (Sas-Paszt et al. 2014). In an attempt to meet these expectations, researchers and people concerned with agricultural practices have shown a growing interest in the use of microbiologically enriched fertilizers.

## Purpose of the project

The aim of the project is to develop innovative microbiologically enriched biofertilizers and to assess the effects of their use in crop production and in improving the bio-physico-chemical properties of arable and degraded soils. The biofertilizers will be produced by combining urea, NPK mineral fertilizers with humic acids and precisely characterized beneficial microorganisms with well-defined properties in the stimulation of the growth and yield performance of crop plants and improvement of the productivity of soils.

## Project activities

The project is organized into 6 work packages (WP) (Table 1).

Table 1. Project activities.

WP no.	Activities
1	Production technology of microbiologically enriched fertilizers
2	Effectiveness of biofertilizers in improving bio-physico-chemical properties of degraded and agricultural soils
3	Effect of biofertilizers on growth and yield of horticultural plants and on soil microbiology
4	Effect of biofertilizers on growth and yield of arable crop plants and on improving soil fertility
5	Assessment of the impact of biofertilizer use on water potential and macro- and microelement content in the soil and plants
6	Preparation for implementation, dissemination and commercialization of research results and newly developed biofertilizers

## The BIO-FERTIL Consortium

- Research Institute of Horticulture, Skierniewice, Poland (Leader)
- New Chemical Syntheses Institute, Puławy, Poland
- Institute of Soil Science and Plant Cultivation – State Research Institute, Puławy, Poland
- Institute of Agrophysics in Lublin, Poland
- GRUPA AZOTY, Puławy, Poland

## Compliance of the project with the objectives of the BIOSTRATEG Programme

The project is in line with the thematic scope of the BIOSTRATEG Programme in the following problem areas:

### 1) Food security and food safety

- Development of new production technologies of mineral fertilizers.
- New possibilities of reducing the negative effects (production and environmental) of simplifications in crop cultivation and rotation.

- Development of reliable systems for tracking and finding a raw material/product in the production and distribution chain to ensure its security and guarantee its origin.

2) *Rational management of natural resources, with particular emphasis on water management*

- Development of methods for preventing soil degradation and for microbial stimulation of their fertility and productivity.

- Analysis of soil condition and development of comprehensive soil cleaning methods, with particular emphasis on brownfield contaminants and those related to agricultural activities.

3) *Counteracting and adaptation to climate change, with particular emphasis on agriculture*

- Development of methods & technologies for reducing soil degradation.

### **Project duration**

36 months: February 2018 – January 2021

### **References**

Sas Paszt L, Pruski K, Żurawicz E, Sumorok B, Derkowska E., Głuszek S. 2014. The effect of organic mulches and mycorrhizal substrate on growth, yield and quality of ‘Gold Milenium’ apples on M.9 rootstock. Canadian Journal of Plant Science 94(2): 281-291

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