**Russian technological breakthrough in fertilizers production**

Providing ecologically sustainable development of Russia in whole as well as development of its economic sectors is a long-term and high-priority task for the country’s development. All this is of high importance for the agri-industrial sector.

Intensification of agricultural industry in Russia and worldwide requires continual improvement of cultivation technologies. Super intensive farming inevitably leads to soil load increase, which comes with mineral fertilizers, pesticides and agrochemicals application rates increase.

Often overfertilization is unable to secure effective mineral uptake for plants. This leads to agrocoenosis pollution, accumulation of the non-available phosphorus, nitrogen, potassium, nutrient elements, as well as to soil microflora disbalance caused by emergence of new phythopathogenic bacterial consortiums resistant to chemical pesticides. Cumulative dressing changes soil features, application of physiologically acidic fertilizers increases soil acidity leading to significant humus losses. Application of high rates of mineral fertilizers causes contamination of soil, agricultural products and freshwaters by nitrates and leads to atmosphere pollution by nitrogen oxides, thus, leading to eutrophication. Continuous application of mineral fertilizers has a great impact on soil microbiota, shown in genus-species relations ratio changes. Moreover, heavy phosphorus and nitrogen fertilizing causes heavy metals and radionuclides accumulation.

As a result, a combination of the following factors:

* Low fixation of mineral nutrients from fertilizers: plants take up only 40-65% of nitrogen from the applied fertilizer, 15-25% of phosphorus and 30-50% of potassium
* Long-continued efficiency decrease of mineral fertilizers
* Soil impoverishment and degradation
* An expressed demand among major producers of the mineral fertilizers for technologies and products that increase efficiency of their key products on the market

became a basis for the new generation of mineral fertilizers – biomodified mineral (biomineral) fertilizers that have significantly higher agronomical, economic and ecological efficiency compared to the traditional mineral fertilizers.

“Biomineral fertilizers” is one of the leading projects in “Agro” sector of the Skolkovo foundation – the largest accelerator in the Russian Federation. MCC “EuroChem”, one of the world leading mineral fertilizer producers, is a co-partner of the project.

Being one of the most advanced technologies in agriculture, sphere of this this development research is recognized as the key one by the mineral fertilizers producers and agricultural producers in Russia and abroad, and considered to be the one to change the economic sector.

In 2002 and 2012 the following patents for biomineral fertilizers production were registered in Russia:

* Method of preparation of biomineral fertilizers and ameliorants (variants) №2512277 от10/10/2012 (<http://www.findpatent.ru/patent/251/2512277.html>)
* Biofertilizers, method of preparation. №2241692 от11/10/2002 (<http://bd.patent.su/2241000-2241999/pat/servl/servlet4c3d.html>)

In 2019, together with its subsidiary companies, “MCC EuroChem” registered three types of biomineral fertilizers as well as a biomodifier for biomineral fertilizers production in EU:

* Ammophos-bio
* Sulfoammophos-bio
* NPK fertilizer-bio (5 brands)

More than 80 trials of different fertilizers/crops /soils/regions have been carried out within the last few years, proving the project to be 97% agronomically and economically justified.

Biomineral fertilizers, when applied at significantly lower rates, increase yield compared to the traditional fertilizers. As a result, the use of biomineral fertilizers can considerably reduce chemical aggression on soils and underground waters leading to positive ecological effects.

Currently, the development of the next generation of improved technologies is being completed based on the existing technologies and microbiological preparations. These are three new microbiological biomodifier preparations of even greater efficiency and stability. They are intended for use specifically with 3 types of mineral fertilizers - nitrogen, phosphorus and complex NPK fertilizers to increase the absorption of nutrients: nitrogen, phosphorus and potassium, reduce environmental risk and increase the profitability of the use of agrochemicals. The preparations are combinations (consortia) of strains of microorganisms, technologically capable of maintaining the required titer when used together with mineral fertilizers in dry (granular) or liquid form.

At the end of 2020 Government of the Russian Federation approved a program for creation and development of the World-Level Scientific Center “Agritechnologies of future” under agreement dd. 16.11.2020 № 075-15-2020-920. “Biomineral fertilizers” is one of its programs. All-Russia Research Institute of Agricultural Microbiology and Saint-Petersburg State University – are project executives, “EuroBiochem” Ltd. – industrial partner. Innovative Technologies and new microbiological products for biomineral fertilizers production are the key objective of the project. The industrial partner is both a co-developer and a company responsible for the project’s results implementation in Russia and on the worldwide market.

The data below represent average rates of yield increase after biomineral fertilizers application compared to the traditional mineral fertilizers (equivalent application rate)

**Indicators of yield increases of existing and developed solutions in comparison with traditional mineral fertilizers**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Type of biomineral fertilizer** | **Nitrogen fertilizers** | | **Phosphorous fertilizers** | | **NPK** | |
| Existing technology  (Bisolbifit) | New biomodifier  BMN | Existing technology  (Bisolbifit) | New biomodifier  BMP | Existing technology  (Bisolbifit) | New biomodifier  BMK |
| **Grain crops** | 4,4% | 7,0% | 7,0% | 10,5% | 9,7% | 12,1% |
| **Industrial crops** | 5,2% | 8,3% | 6,0% | 9,0% | 9,8% | 12,2% |
| **Vegetables** | 5,5% | 8,5% | 6,3% | 9,3% | 6,5% | 10,1% |

In 2020, the project was acknowledged as a leading innovative project in the largest contest of agricultural projects held by the Skolkovo foundation.

This data has been prepared for informational purposes only by “EuroBiochem” Ltd. (info@eu-bio.ru)