European Network for Rural Development

Improving the soil's fertility using new generation microelements

EAFRD-funded projects

LITUANIA

Farm's performance, restructuring & modernisation

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Kaunas

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2014 – 2020

Priority
P2 – Competitiveness

Measure
M16 - Cooperation

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National/Regional 79 514.70
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2016 – 2019

Project promoter*
House of Agriculture of the Republic of Lithuania

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An EIP-AGRI project on improving the soil's quality and structure, using new generation microelements and microorganisms.

Summary

The decreasing soil quality is a significant problem for farmers and is mainly due to the extensive use of fertilisers and intensive farming. The surplus of nitrogen fertilisers leaking into the water bodies is damaging the environment. In addition, the large volumes of fertilisers needed, which are getting more and more expensive, increase production costs and decrease the farms' profitability.

Even organic farmers face the problem of low fertility. While they only use organic fertilisers, these do not improve the quality of the soil.

This EIP-AGRI project brought together scientists, a consulting institution and farmers to carry out experimental tests on improving the soil's quality, by reducing the use of nitrogen fertilisers and increasing the production's yield and quality. The experimentation focused on the use of new generation microelements and on improving (restoring) soil structure with the help of microorganisms.

Results

The project results showed that when the volume of nitrogen fertilisers was reduced by 50% in conventional farms growing grain cultures (summer and winter wheat, peas, beans, oats, barley) and the products NaturGel and Probio Humus were applied, fertility increased and the profit of these farms increased from EUR 9 /ha to EUR180 /ha.

The tests also showed that treated plants survived droughts better. They were healthier and germinated and ripened at the same time. Although the general fertility was low because of poor weather conditions (rain showers, droughts), in the experimental fields it was still higher by 3-45%.

Soil tests showed that most of the mineral nitrogen applied was absorbed by the soil in the experimental fields. The amount of humus and organic carbon is increasing in the soil of the experimental fields and the humification process was stimulated.

* The Project promoter/beneficiary is an EIP-AGRI Operational Group (https://ec.europa.eu/eip/agriculture/en)

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Context

Lithuanian farmers experience several challenges in relation to the use of fertilisers, which have a negative impact on the environment. About 20% of the soil in Central Lithuania and 74% in Eastern Lithuania has low levels of humus. Up until now, farms often used mineral and organic fertilisers and did not consider the relationship between the different mineral nutrition elements. They mainly used nitrogen and insufficient amounts of phosphorus and potassium. As plants absorb only up to 50% of nitrogen fertilisers, large quantities were lost into the ground and surface waters. Another problem is that organic producers who cultivate on infertile land can only use certain types of organic fertilisers. However, these fertilisers allow for low production yields and do not prevent the deterioration of soil quality. In addition, rising fertiliser prices increase the cost of production and reduce profitability. Therefore, alternative fertilisation measures are necessary.

Objectives

The project aimed to develop new types of fertilisers to improve the quality of the soil and reduce the use of nitrogen fertilisers, without compromising the farms' profitability and even increasing it.

Activities

This EIP-AGRI Operational Group brought together scientists, a consulting institution and farmers to carry out experimental tests on improving the soil's quality, using new generation microelements contained in the products NaturGel and Probio Humus, to improve and restore soil structure with the help of microorganisms.

The project was carried out in three stages. During the first stage the Operational Group came together to define its next steps. A team was formally assigned to implement the project. The project team prepared an information stand and published an informative article. The Operation Group members then selected the fields to be used for the trials.

The second stage involved carrying out the experimental tests. Separate methodologies were developed for tests on different crops (cereals, vegetables and berries) that were grown on soils of different productivity (productive and inefficient) and on different farms (conventional, organic and National Quality Products (NQP)). The tests aimed to reduce the rate of nitrogen fertilisers used for conventional and NQP farms by 50%, by applying and testing different timings and quantities of NaturGel and Probio Humus.

NaturGel is intended for plant productivity and Probio Humus is used to improve plant and soil health. Both NaturGel and Probio Humus, are commercial products and have different performance characteristics. They both help to compensate for the reduction of the rate of nitrogen fertilisers applied by half and thereby preserve plant fertility. Probio Humus is suitable for both organic and conventional farming.

Soil surveys were conducted on a regular basis for two years during the spring and autumn, to determine the initial soil situation and the changes. The Operational Group also tested the yields achieved from the trials and checked their impact on the environment. The test results were processed and published.

During the implementation of the project, the methodology applied was demonstrated on 21 farms. The Operational Group also organised publicity events to demonstrate the results of the project. The project results were published on the websites of the Lithuanian Rural Network and the Chamber of Agriculture. Articles were published in the national press (one article per year - four articles in total) and leaflets were distributed. During the implementation of the project, 42 conferences were organised.

During the third and final stage of the project, the Operational Group submitted its final report and its application for payment to the National Paying Agency.

Main results

After the tests performed between 2017 and 2019, it was determined that:

1.1. When the norm for nitrogen fertilisers was reduced by 50% in conventional farms growing grain cultures (summer and winter wheat, peas, beans, oats, barley), and NaturGel and Probio Humus were applied, this resulted in increased fertility and the profit of these farms increased from EUR 9 /ha to EUR 180 /ha;

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1.2. When NaturGel and Probio Humus were applied in organic farms growing grain cultures (summer wheat, oat, buckwheat, beans), this resulted in an increase in fertility and the profit of these farms increased from EUR 7 /ha to EUR 41 /ha;

1.3. When NaturGel and Probio Humus were applied in organic farms growing vegetables (carrots, beetroots, cabbage), this resulted in the improvement of the qualitative characteristics of vegetables (carotenoids, sugars, antioxidant activity, total count of phenols, vitamin C), increased fertility from 8 to 20% and increased profit from EUR 17 /ha to EUR 764 /ha;

1.4. When NaturGel and Probio Humus were applied on the farm producing products of national quality (carrots, onions, beetroots, cabbage), this resulted in the improvement of the qualitative characteristics of the vegetables (carotenoids, sugars, antioxidant activity, total count of phenols, vitamin C) and increased fertility from 9 to 21%. As no fertilisers were used, profitability increased from EUR 118 /ha to EUR 1049 /ha;

1.5. When NaturGel and Probio Humus were applied on the organic farm growing black currants, this resulted in an improvement of the qualitative characteristics of the black currants (sugars, antioxidant activity, total count of phenols, vitamin C) and increased fertility by 0.69 t/ha. The profit of this farm increased by EUR 200 /ha;

1.6. When NaturGel and Probio Humus were applied on conventional farms growing strawberries, this resulted in the improvement of the qualitative characteristics of strawberries (sugars, antioxidant activity, total count of phenols, vitamin C) and strawberries were more resistant to drought. The harvest increased from 0.3 t/ha to 0.64 t/ha. As no fertilisers were used, profitability increased from EUR 542 /ha to EUR 1182 /ha.

2. The tests revealed that the treated plants survived drought better. They were healthier and germinated and ripened at the same time. Although the general fertility was lower because of poor weather conditions (rain showers, drought) in the experimental fields it was still higher by 3 to 45%.

3. Soil tests showed that more of the mineral nitrogen was absorbed by the soil in the experimental fields. The amount of humus and organic carbon in the experimental fields is increasing in the soil and the humification process has commenced.

Additional sources of information

www.kaimotinklas.lt/lt/projektai/dirvos-strukturos-ir-kokybes-gerinimas-atstatymas-naudojant-mikroorganizmus-azoto-junginiu-emisijos-mazinimas-issaugant-augalu-produktyvuma-naudojant-naujos-kartos-mikroelementus-1

https://ec.europa.eu/eip/agriculture/en/find-connect/projects/dirvos-strukt%C5%ABros-ir-kokyb%C4%97s-gerinimas-naudojant

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