

BIOFIL[®]



BECAUSE SOILS ARE DIFFERENT



TERRAGRO

Catalogue

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We prepared our latest product brochure with great pleasure and care!

Our goal is to raise awareness of the importance of sustainable crop production and to promote the advantages of using biological solutions. We respect and love the environment that surrounds us and we understand that it is our shared responsibility to protect and preserve it. We believe that with the tools and support of microbiology we are able help sustainable farming.

Our awards



PRODUCT AWARD
"FOR THE HUNGARIAN PLANTING"
2015

BIOFIL Acidic, Normal, Alkaline
Soil inoculant bacterial preparations



BLUE RIBBON
HUNGARIAN PRODUCT
2015

BIOFIL Acidic, Normal, Alkaline
Soil inoculant bacterial preparations



PRODUCT AWARD
"FOR THE HUNGARIAN PLANTING"
2022

BIOFIL Climate
Soil inoculant bacterial preparations



BLUE RIBBON
VALUE AND QUALITY
from 2017
BIOFIL Acidic, Normal, Alkaline
Soil inoculant bacterial preparations



SPECIAL AWARD FOR THE NATIONAL
PRODUCT DEVELOPEMENT
2016
BIOFIL Pea, Soya
Soil inoculant bacterial preparations



PRODUCT AWARD
"FOR THE HUNGARIAN PLANTING"
2023
BIOFIL Soya DUPLO
Soil inoculant bacterial preparations

CONTACT OUR ADVISORS:

The notability and appreciation of the products distributed by Terragro Ltd. among farmers is increasing year by year, thanks to skillful and exceptional product development, continuous field testing and a unique research infrastructure in the field of biological solutions. The constantly improving financial indicators of Terragro Ltd. are proof of the quality of our collective work.

For more informaton about our products please contact our overseas sales representative:

Phone: **+36 (70) 557-1849**

E-mail: **info@terragro.hu**





BIOFIL®

Soil specific products

The preparations represent the latest and most effective generation of microbial soil inoculants on both domestic and foreign markets. You can choose inoculants based on the pH value of the soil.

FOR IMPROVING NUTRIENT SUPPLY

The pH values of the soils of different agricultural sectors show a very diverse picture around the world. The microbiological life of soils is also significantly affected by their pH value. Different bacterial strains and microbiome can be found in an acidic or alkaline soil, accordingly only those soil preparations can be effective under different soil conditions which take into account the differences of the living environment!

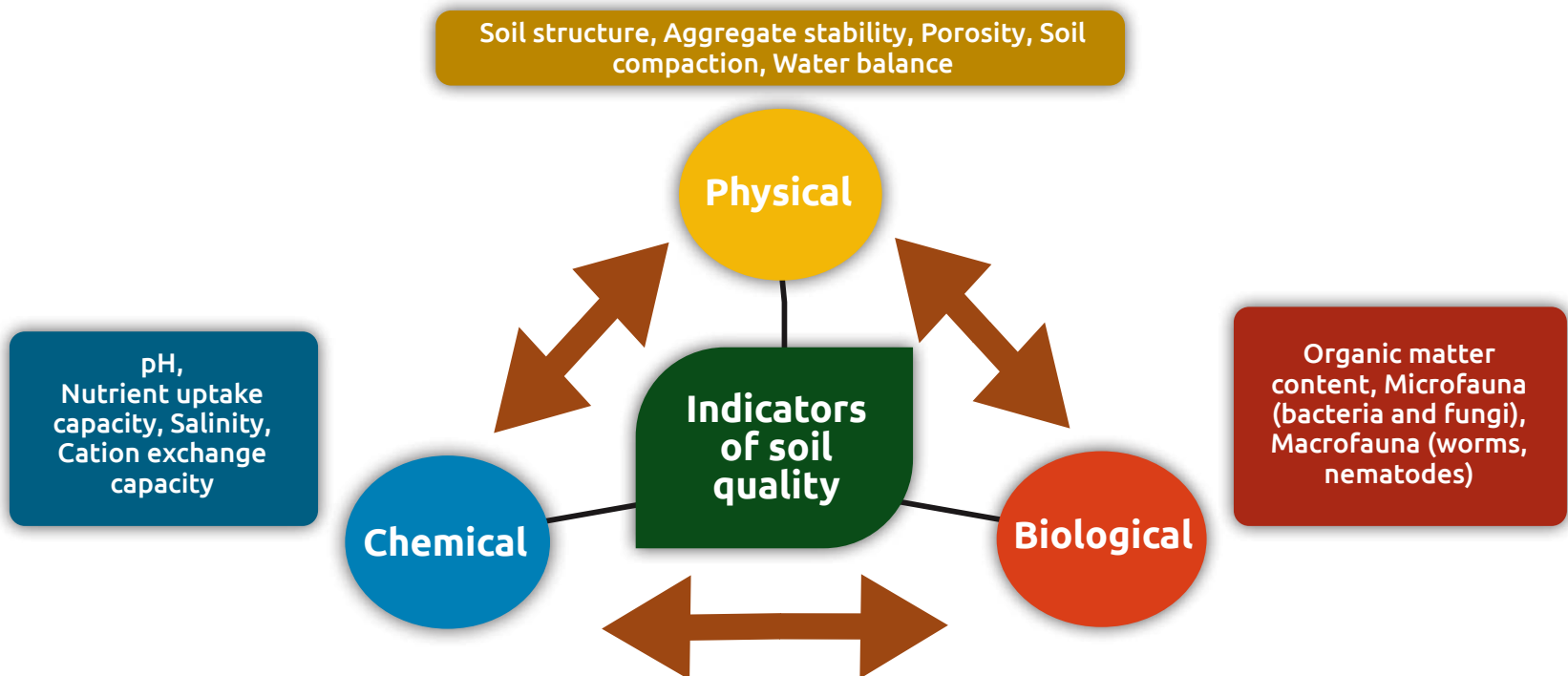
The **BIOFIL® soil specific inoculants** consists of stress tolerant bacterial strains from the soils of the Carpathian Basin isolated by our researchers. These bacterial strains work well even under extreme soil conditions. **BIOFIL® Acidic**, **BIOFIL® Normal**, and **BIOFIL® Alkaline** are effective inoculant preparations which unlike traditional inoculating strains can function effectively in all soil types and under much wider range of soil conditions.



THE SOIL AS A COMMUNITY OF LIFE

The physical, chemical and biological properties of the soil are closely related as it is presented on our diagram showing some indicators and processes of soil quality. The pH value of the soil does not only affect the nutrient uptake or cation exchange capacity, but it is also one of the determinants of the microbiological composition and viable microbiom content of the soil.

As mentioned above, **BIOFIL® Soil specific products** are the most complex soil inoculant preparations in terms of composition and properties. Each of the 3 formulations contain effective **nitrogen-fixing, potassium, phosphorus** and **microelement mobilizing** bacteria, that produce **plant growth stimulating hormones** and ensure proper soil structure and health!



BIOFIL®

ACIDIC

SOIL INOCULANT
BACTERIAL PREPARATION

For the improving
nutrient supply



COMPOSITION OF BIOFIL® SOIL SPECIFIC PREPARATIONS

BIOFIL® Soil Specific Products are soil inoculant preparations with the most complex content and soil protection properties. Each of the three formulations contain stress tolerant, effective nitrogen fixing, potassium, phosphorus and micro-nutrient mobilizing bacteria that produce plant growth stimulating hormones and ensure proper soil structure and soil health. They effectively support the crops during the entire growing season.

BIOFIL® ACIDIC

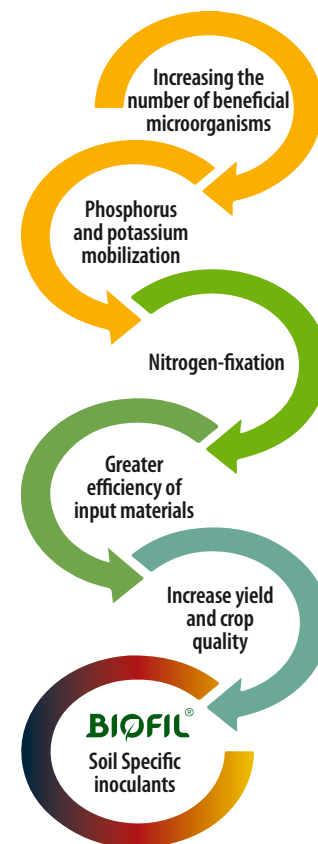
One of the main obstacles of production can be soil acidity in arable and cultivated grasslands. Due to natural and anthropogenic causes, these areas require constant attention and improvement where necessary.

The BIOFIL® Acidic soil inoculant can positively influence certain negative processes in acidic soils and production limiting conditions arising from the low pH value.

pH SCALE 0.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10.....11.....12.....13.....14

BENEFITS OF USING BIOFIL® ACIDIC

- ☑ Availability of certain nutrients and the utilisation of the applied nutrients are improved.
- ☑ As a result of the siderophore producing capacity of certain strains in the product the habitat of pathogenic fungi that can infect plants is reduced.
- ☑ It promotes the decomposition of organic matters, produces polysaccharides and improves soil structure.
- ☑ It fixes nitrogen, mobilises potassium and phosphorus, and produces plant growth-promoting hormones.



BIOFIL® NORMAL

BIOFIL® Normal soil inoculant has been developed for our best soils in terms of their pH value. The composition of the inoculant is primarily designed for the preservation of the agronomically most desirable soil properties and their improvement where possible.

BENEFITS OF USING BIOFIL® NORMAL

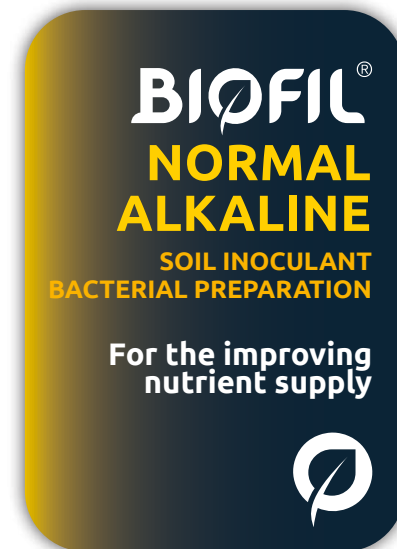
- 🌱 Its outstanding nitrogen fixation capacity enhances optimal nitrogen supply.
- 🌱 Ensures nutrient mobilisation (mainly potassium and phosphorus), thus supporting proper plant development.
- 🌱 It helps to maintain highly aggregated soil structure by producing polysaccharides.
- 🌱 Produces plant growth hormones and through the production of siderophores performs plant protection functions.
- 🌱 Improves the utilisation of input material.

BIOFIL® ALKALINE

Alkaline soils have significant sodium content which negatively affects soil structure and its water and nutrient management properties. The availability of certain microelements (iron, mangan, copper and zinc) phosphorus and boron may be limited in alkaline soils. The composition of BIOFIL® Alkaline Soil Inoculant was developed to improve these negative soil properties.

BENEFITS OF USING BIOFIL® ALKALINE

- 🌱 It fixes atmospheric nitrogen and produces plant growth hormones.
- 🌱 Improves soil structure and water balance and is an excellent producer of siderophores.
- 🌱 Mobilises phosphorus, potassium and microelements and increases nutrient utilisation. Has good salt tolerance.
- 🌱 Improves soil structure, mainly by loosening hard soil structure.



PROPOSED BIOFIL® SOIL SPECIFIC TECHNOLOGY

Developed for the treatment of soils with different pH values (acidic, normal, alkaline). Dosage: **1-1.5 l/ha**, diluted in **50-400 l water/ha**, **applied at the time of sowing/planting or during soil preparation**, sprayed onto the soil and rotated in. Do not mix the preparation with bactericides and fungicides!



BIOFIL®

Culture-specific products

The nitrogen supply of *Fabaceae* plants - due to their specific biology - is ensured by the nodules formed on the roots. This is a symbiotic relationship between the plant and rhizobium bacteria. Proper nodule formation is one of the determinants of the right crop quantity and quality.

FOR RELIABLE NODULE FORMATION

The proper yields and crop quality in case of *Fabaceae* plants (*Fabaceae* or *Leguminosea*) require the presence of **specific bacterial strains that are necessary for nodule formation**. This is *Bradyrhizobium japonicum* in case of soya and *Rhizobium leguminosarum* in pea. If the right bacterial population can be ensured at the time of nodule formation in the soil and on the seed surface, legumes can fix 50-75% of their nitrogen needs from atmospheric nitrogen. The results of inoculation are detectable not just in the growing season. We should also consider the positive long-term effects of the large amounts of nitrogen remaining in the soil after the growing season, which will be used by the succeeding crops, e.g. autumn cereals grown after soya or pea.

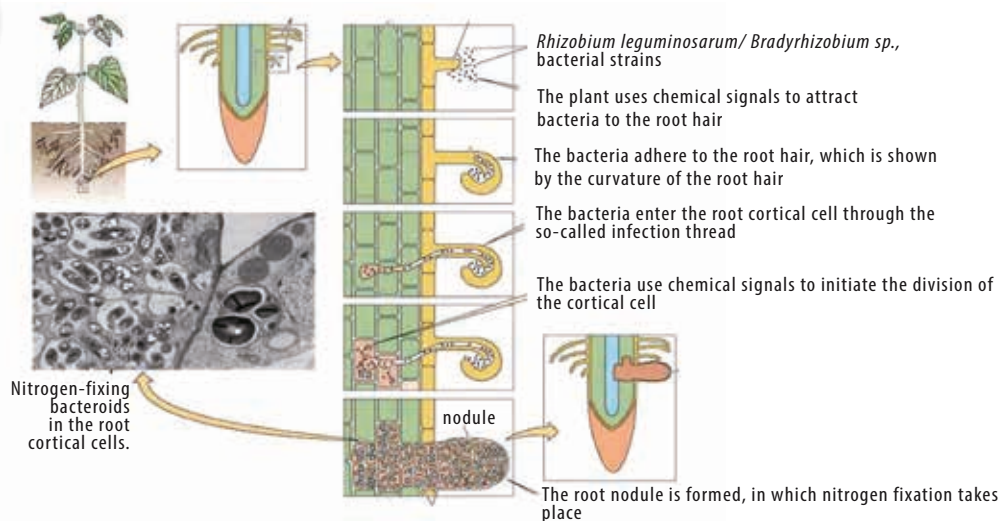
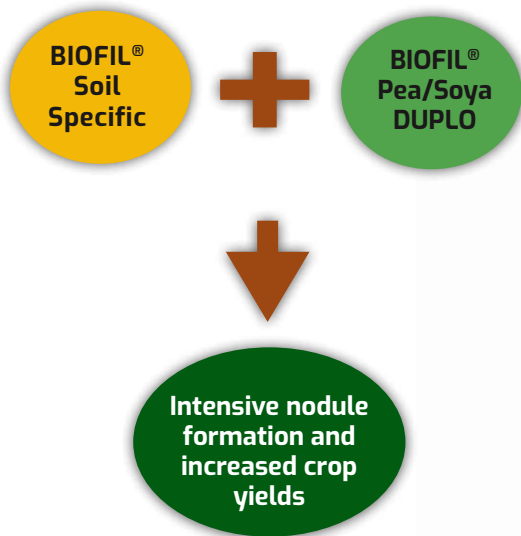


BENEFITS OF USE

- ☑ Application of the preparation results in **efficient nodule formation**, which ensures most of the nitrogen the plant needs.
- ☑ The **nitrogen remaining in the soil** is also beneficial for the yields of the succeeding crops.
- ☑ In large-scale field trials the treatments have been shown to result in **higher yields** and **improve** for example **PROFAT value** in soya.
- ☑ The preparations support the **dynamic development** and **optimal growth** of the plants.
- ☑ Cultivated plants become **healthier** and more **stress tolerant**. Proper nodulation results in better drought tolerance.

MECHANISM OF ACTION

As a result of inoculation the nodules formed on the root system of *Fabacea* plants (both on primary, secondary, tertiary roots and root hairs) effectively supplies nitrogen to the plant and improve plant health.



Source: The Science of Biology, 8th Ed.(2007) Sinauer&-Freeman Co. alapján



BIOFIL®

Pea

SOIL INOCULANT
BACTERIAL PREPARATION

The vitality
of pea



COMPOSITION

BIOFIL® Pea soil inoculant contains a symbiotic nitrogen-fixing bacteria strain (*Rhizobium leguminosarum*), which has effective nodule formation and strong nitrogen-fixing capacity.

MECHANISM OF ACTION

Rhizobium leguminosarum, a bacterium that forms nodules on the roots of pea, like all rhizobia, infects the root hairs during root growth. The symbiotic bacteria in the nodules exchange nutrients with the plant. **In case of proper nodulation on pea roots the bacteria can provide most of the nitrogen the plants need in the growing season.** Furthermore, after cultivation, a significant amount of nitrogen can remain in the soil that is available for the succeeding crops, which is particularly beneficial for cereals.

It should be noted that excessive nitrogen supply will result in poor nodulation on pea. In case of proper treatment and nodulation, the pea will grow faster, produce higher yields, and will have better nutritional values.

PROPOSED TECHNOLOGY

For soil inoculation to promote nodulation, applied in a minimum dose of **0.4 l/ha**, diluted in **50-200 l water/ha**, depending on the application equipment, sprayed onto the soil **during seed-bed preparation** and then immediately rotated in. BIOFIL® Pea is recommended to be used in combination with BIOFIL® soil specific preparations. The applied dose should be min. **0,4 l/ha BIOFIL® Pea and 1 l/ha BIOFIL® Soil Specific inoculant** mixed in a tank mix.



COMPOSITION

The bacterial inoculant BIOFIL® Soya DUPLO contains a highly effective symbiont, nitrogen-fixing bacterial strain (*Bradyrhizobium sp.*) responsible for soya nodulation and a bacterial strain (*Ensifer sp.*) that promote nodulation. As a result of the new, improved composition of the product the safety of nodulation is increased, and more nodules are produced. Stress resistance, yield and crop security of the plants are increased. The bacteria in the preparation are plant specific, they form nodules only on soya and not effective on other cultivated *Fabaceae* plants.

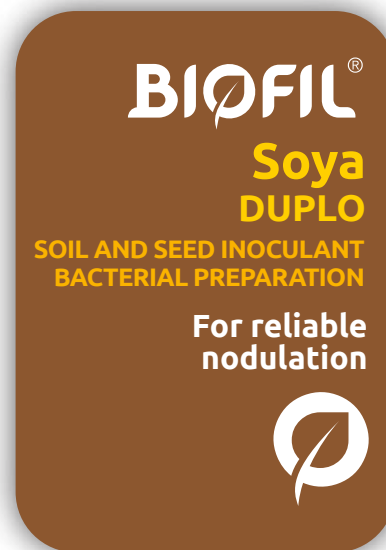
PROPOSED TECHNOLOGY

BIOFIL® Soya DUPLO soil inoculant is recommended to be used in combination with BIOFIL® Soil Specific inoculants. The preparation is mainly suitable for soil inoculation, but it can also be used for seed treatment.



Applied dose for soil inoculation: 0.5-1 l/ha BIOFIL® Soya DUPLO. To achieve the optimal microbial effect, we recommend the combined application with **BIOFIL® Soil Specific** products (Acidic, Normal, Alkaline). In this case the maximum dose is **1.5 l/ha**. BIOFIL® Soya DUPLO and Soil specific bacterial products should be diluted in min. **50-400 l/ha water**, depending on the application equipment, sprayed onto the soil during seed bed preparation and then rotated immediately.

The dose to be applied for seed inoculation: 3 liters of BIOFIL® Soya DUPLO bacterial preparation and **1 litre of BIOFIL® Extra** is to be mixed and applied evenly to 1 ton of seed in one application. The treated seed can only be used in dry condition! In case of seed treatment, we recommend to mix the product with the other seed treatment materials from triazole group. The products must not be mixed with bactericides and fungicides!





BIOFIL®

Post Harvest

Decomposition is an essential element of returning organic matters back to the soil.

BIOFIL® Post Harvest technology can decompose post-harvest stalk residues quickly and efficiently without using the nitrogen stored in the soil.

FOR EFFICIENT AND QUICK DECOMPOSITION

The natural capacity of our soils to decompose plant residues is often limited. **BIOFIL® Post Harvest** bacteria ensure fast and intensive decomposition of cellulose. They are able to multiply even at low soil temperatures. As the product contains bacterial strains that tolerate wide soil pH range, they can be applied effectively in acidic, alkaline and normal pH soils. The product also contains an effective nitrogen-fixing bacterial strain; therefore no extra nitrogen is necessary for decomposition of stubble residues. The product is effective in limiting the survival of harmful pathogenic fungi during the winter in the soil, mainly by limiting their habitat, i.e., by effectively reducing the amount of stem residues.

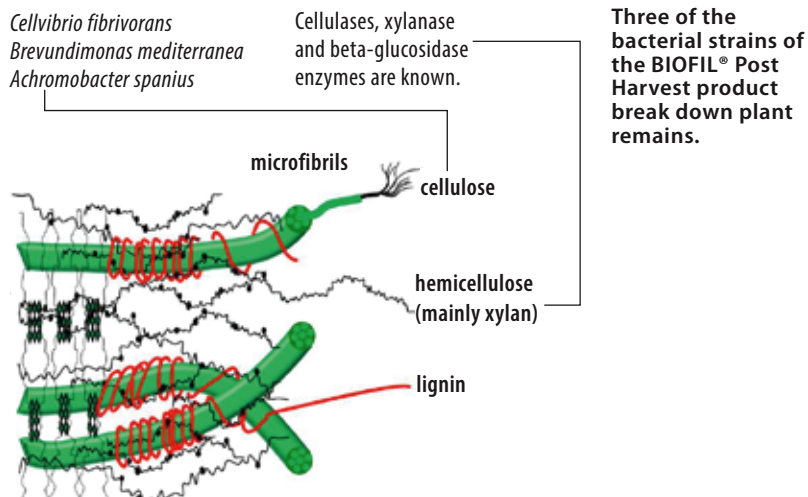


COMPOSITION

BIOFIL® Post Harvest contains several bacteria that effectively decompose plant residues (*Brevundimonas mediterranea*, *Cellvibrio fibrivorans*, *Achromobacter spanius*). They produce decomposing enzymes (xylanase, cellulase, beta-glucosidase) that complement and support each other. The product also contains nitrogen fixing-bacteria (*Azotobacter chroococcum*).

BENEFITS OF USE

- Decomposition of plant residues is more economic compared to the use of nitrogen fertilisers.
- It provides nutrients for the plants.
- Reduces the habitat of pathogens that can overwinter and limits the ability of pathogenic fungi (e.g., *Fusarium*) of good stem decomposing capacity.
- Contains an effective nitrogen fixing bacterium, therefore nitrogen deficiency does not occur.
- Cultivation difficulties - caused by stem residues of the harvested crop - are reduced when sowing the next crops culture.
- Due to the improved soil structure, the required traction power is reduced.



Source: <http://www.intechopen.com/books/biomass-now-cultivation-and-utilization>

BIOFIL®
Post Harvest
BACTERIAL
PREPARATION

Organic matter
replenishment



RECOMMENDED TECHNOLOGY

The preparation should be applied before or at the time of stubble ploughing. **BIOFIL® Post Harvest** should be applied in a dose of **1.0-1.5 l/ha**, diluted in **25-50 or 200-400 l/ha of water**, depending on the spraying tool. If the succeeding crop is planned for the same year, **BIOFIL® Post Harvest** is recommended to be used in combination with **BIOFIL® Soil Specific** preparations. For further, detailed advice please contact us. The preparation is most effective when applied on stem residues immediately before they are rotated into the soil.



Decomposer



BIOFIL[®]

Foliar fertilizers

We recommend the use of our foliar fertilizers in phenophases with high demand to mitigate the effects of extreme weather conditions and unfavourable soil conditions. Their composition is selected according to the latest, most effective environmental management principles.

YIELD INCREASE ON LEAVES

Among our biostimulator type foliar fertilizers there are algae and preparations containing humic and fulvic acids. Basically, **algae foliar preparations** enhance the plants' physiological processes, nutrient uptake, the growth of vegetative and generative plant parts, ultimately the crop yields. The general stress tolerance and therefore drought tolerance of the plants are also significantly improved. **Foliar fertilizers containing humic and fulvic acids** - due to their natural complex forming property - can deliver nutrients directly to plant cells and help their utilization. They enhance stress tolerance, stimulates the growth of green mass and yield and are excellent for effectively handling situations that require immediate and rapid solution.



BENEFITS OF USING BIOFIL® ALGAE

- ☑ Contains **live algae** in an exceptionally high concentration.
- ☑ Contains well-known, **plant growth-supporting** bacteria with proven effect.
- ☑ The product also contains **plant hormone-like substances** and **phytohormones** – produced by the microorganisms of the product - that support resistance, fruit formation and yield increase.
- ☑ The vital macro-, meso- and microelements can be found in the product in an organic bond, it supplies the plant with amino acids, vitamins and bioactive substances.
- ☑ The strains of microalgae and bacteria are **applied to the surface of the leaves** and act through them. It has a long-term effect as the active ingredients are **gradually absorbed** through the leaf surface over a prolonged time.



THE BENEFITS OF TERRAHUMIN

- ☑ It contains **macro-, meso- and microelements**.
- ☑ The applied nutrient is **utilised rapidly** with a **very high efficiency**.
- ☑ It is excellent for **treatment of damaged plants** (e.g. hail damage).
- ☑ **Increases the stress tolerance of plants** (e.g., against frost, drought, and other damages).
- ☑ Intensifies the plants' resistance to pathogens.
- ☑ It ensures a balanced nutrient management.
- ☑ Higher yields and better crop quality is available.



BIOFIL®

ALGAE

MICROBIOLOGICAL
PREPARATION

The natural
yield enhancer



COMPOSITION

BIOFIL® Algae is a combined-effect microbiological preparation containing two microalgae (*Chlorella vulgaris*, *Chlorella zofingiensis*) and three soil bacteria strains (*Azotobacter vinelandii*, *Azospirillum canadense*, *Bacillus proteolyticus*).

MECHANISM OF ACTION

The preparation exerts its positive effect primarily through the leaves and only secondarily through the soil.

Effect through the leaves: algae cells and beneficial bacteria in the preparation are able to establish a direct contact with the plant. Some bacteria can enter the plant through the gas exchange pores (stomata), others colonise the leaf surface. Beneficial nutrients (macro-, meso- and microelements, amino acids, vitamins, etc.), plant hormones and hormone-like substances produced by microalgae and bacteria enter the plant cells by diffusion. Absorption from the leaf surface is almost complete, above 90%. The microalgae and plant growth promoting (PGP) bacteria in the preparation support the plant's defence against pathogenic fungi.

Soil action: foliar fertilizer applied in early phenophases, is partly deposited on the ground. The microorganisms in the preparation help the microflora in root colonization thereby improve plant viability through the soil.

PROPOSED TECHNOLOGY

The product shall be applied for the treatment of all arable crops in a **dose of 1-2 l/ha**, twice per growing season, **diluted in 250-300 l/ha water**. Strong sunlight, windy weather and heavy rainfall should be avoided during application. Do not mix it with algacides, bactericides and fungicides!



COMPOSITION

The preparation contains humic and fulvic acids, macro-, meso- and microelements, K-Humate, fertilisers and water. Humic acid content is min: 3,5 (m/m%), N content: 5,0 (m/v%), P_2O_5 content: 10,0 (m/v%), K_2O content: 2,5 (m/v%), meso- and microelement content (m/v%): CaO 0,05; MgO 0,08; SO_3 0,7; B 0,008; Cu 0,006; Fe 0,04; Mn 0,01; Mo 0,001; Zn 0,005.

MECHANISM OF ACTION

The humic and fulvic acids in the product - thanks to their natural complexing properties- can deliver nutrients and compounds directly to the plant cells, enhancing their utilisation. In general, they stimulate the physiological processes in plants, restore chemical balance, harmonise and activate plant life processes. These ingredients also increase stress tolerance, stimulate growth and yield. Humic acids primarily promote root mass growth, thereby increasing the uptake of nutrients and water from the soil. Fulvic acids act through the plant tissues during foliar fertilisation.



TERRAHUMIN

PLANT CONDITIONING
PREPARATION

Instant
help



PROPOSED TECHNOLOGY

Use of the product is recommended with the dose of **2-4 l/ha**, diluted with **200-400 l water/ha** specifically in **cereal crops, maize, sunflower, rapeseed and soybean** but it can also be used in the following crops: apple, rice, sorghum, millet, buckwheat, canary grass, mustard, poppy, peanut, sesame seed, cotton, linseed, pumpkin seed, oilseed pumpkin, oilseed radish, sugar beet, potato, tobacco. Please contact us for recommended doses, dilution ratios and correct timing of application which vary by crops. A mixing test has to be carried out before application together with plant protection products and other crop enhancers.





BIOFIL[®]

Soil improvement and health preservation

Biological solutions are becoming increasingly widespread alongside with the use of chemicals in agriculture. This applies to both soil and plant health products and soil improvers. The following products have been developed specifically for these purposes.

SOIL MAINTENANCE

Rhizosphere (direct environment of the root) is one of the most complex microhabitats, consisting of a diverse consortium of bacteria, fungi and other soil-dwelling organisms. Soil condition directly affects the plant physiological properties and yields. Thus, knowing the problems in the growing area, its development and design can be a significant advantage for any producer.

The condition of the rhizosphere can determine the success of the production. We can specifically and effectively improve and plan the condition of the rhizosphere with the help of BIOFIL[®] soil improvement and health preservation products. We may be able to create a pathogen free (e.g., fusarium, sclerotinia) root environment with improved water management and nutrient utilisation in a sustainable way!



PLANT AND SOIL HEALTH

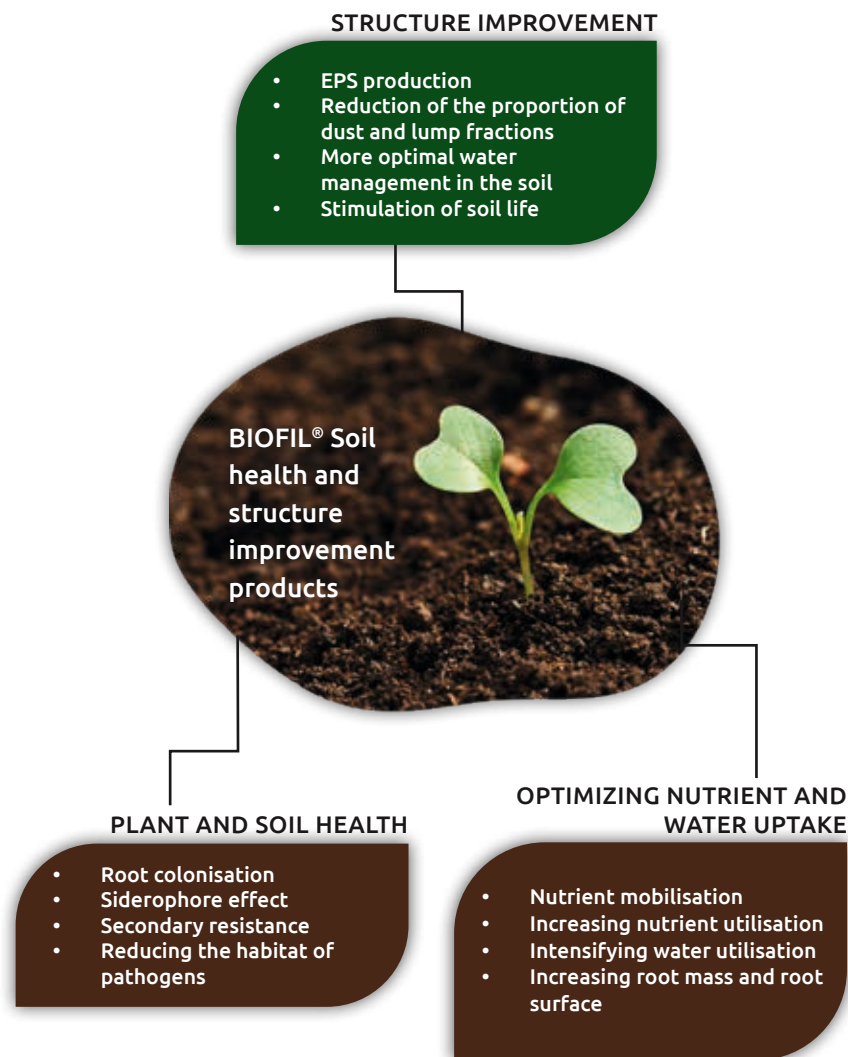
Some soil bacteria preparations can specifically increase the number of beneficial microbes that are very effective in increasing plant resistance to pests (e.g.: by increasing secondary resistance). They reduce the amount of iron available for pathogenic fungi by producing siderophores, or by colonising the root and rhizosphere to exclude pathogens from the root zone, thereby reducing their habitat.

SOIL STRUCTURE IMPROVEMENT

Climate change, intensive cultivation or soil structure can lead to factors that are unfavourable for crop production, e.g., loose structure of sandy soils, negative effects of water scarcity periods and the degradation of good soil quality. There are available soil bacteria preparations to manage these conditions effectively and to increase water and nutrient supply for plants. Thanks to their EPS-producing function, these preparations can improve soil structure and water supply, stimulate soil life and prevent nutrient leaching.

OPTIMIZATION OF NUTRIENT AND WATER UPTAKE

Preparations made from mycorrhizal fungi are very effective in increasing root surface. This allows the root system to absorb water and nutrients from a much larger soil layer, thus increasing for example drought resistance of plants and the utilisation of nutrients as they are converted into an absorbable form by the help of bacterial preparations.



BIOFIL®

SOIL GUARD

SOIL INOCULANT
BACTERIAL PREPARATION

The reliable
protector



INGREDIENTS

BIOFIL® Soil Guard contains *Bacillus sp.* strains, which protect the plant through several complementary actions, mainly against pathogenic fungi that infect the soil. Thanks to its spore state, the inoculant does not lose its guaranteed live bacteria content for 2 years, stored at room temperature without refrigeration. The spores can retain their germination capacity for a long time under unfavourable conditions, however when sprayed on and rotated into the soil, they germinate rapidly under favourable conditions and the bacteria multiply in the soil.

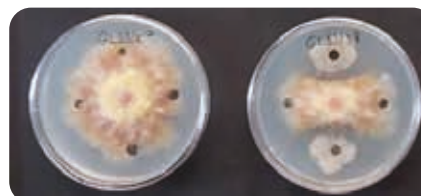
MECHANISM OF ACTION

Bacillus bacteria strains primarily inhibit soil-borne pathogens (*Fusarium*, *Sclerotinia*, *Aspergillus*, *Botrytis*, *Alternaria*, *Macrophomina*, *Rhizoctonia*). They also have plant growth-promoting activity (PGP). The strains produce siderophore molecules that bind iron from the root environment in the form of iron-siderophore. The root environment thus becomes iron-deficient for many pathogenic fungi because they cannot uptake and utilize iron siderophores, thus their growth and spread is reduced, while plant roots are able to take up iron siderophores.

PROPOSED TECHNOLOGY

Sprayed on the soil during soil preparation or at sowing, and then **rotated into a depth of 5-10 cm**. Dose: **0,2-0,4 l/ha** for all arable and horticultural crops, mixed with **50-400 l/ha of water**, depending on soil moisture and the application equipment. It can also be used during the growing season in **a dose of 0,4 l/ha**, in a maximum **concentration of 0,5 %**, applied during the intensive growing period. It can be mixed with all BIOFIL® products, both liquid and foliar fertilisers.

Fusarium graminearum



Untreated

BIOFIL Soil Guard

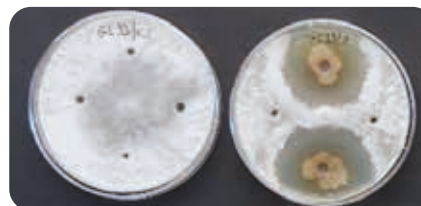
Alternaria alternata



Untreated

BIOFIL Soil Guard

Sclerotinia sclerotiorum



Untreated

BIOFIL Soil Guard

Aspergillus sp.



Untreated

BIOFIL Soil Guard

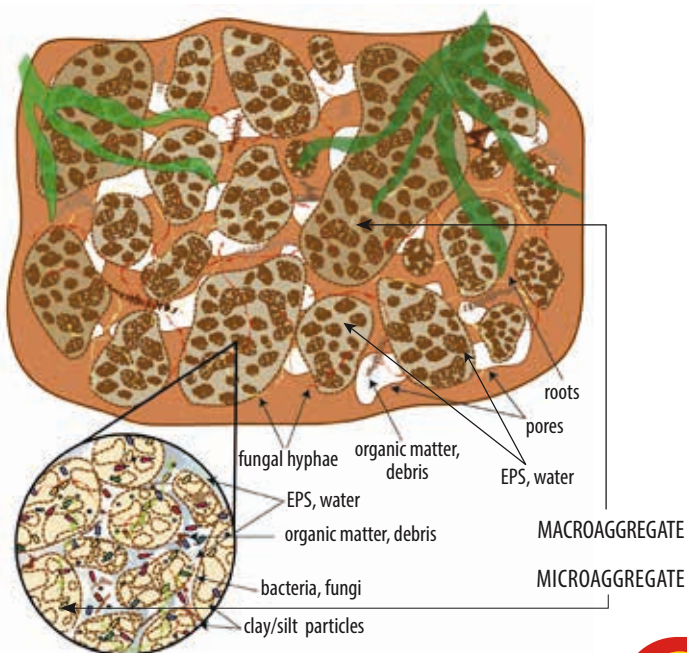


COMPOSITION

The “A3” component contains bacteria that can produce “adhesive” and biofilm-forming special EPS (exopolysaccharide) in large quantities, which is necessary for the formation of the good soil aggregate structures and water retention. The “Extra” component contains plant origin sugars and various extracts in addition to the nutrients necessary for the multiplication of bacteria.

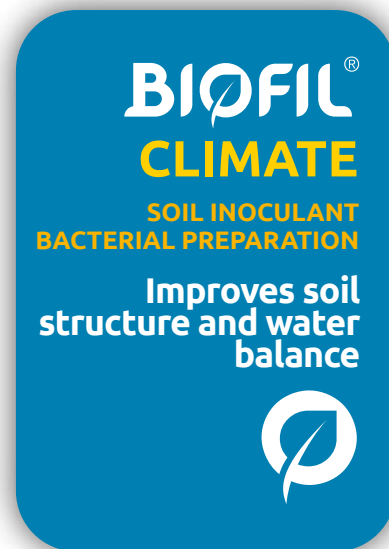
MECHANISM OF ACTION

There are macro and micro aggregates on the picture. The polysaccharides (EPS slime-like substance) produced by bacteria has an adhesive role in the construction of aggregates and form biofilm on the surface of the aggregates. The bacterial strains in BIOFIL® Climate also produce large quantities of these special mucus (EPS), supporting aggregate formation and water retention.



PROPOSED TECHNOLOGY

The dose of **BIOFIL® Climate “A3”** component is **1–2 l/ha in all arable and horticultural crops**, depending on the soil moisture content and the application equipment. It has to be mixed with **50–400 l/ha water** applied during soil preparation, or at the latest at sowing in one pass, sprayed on the soil and **rotated into a depth of 5–10 cm**. In case of no-till cultivation or direct sowing in the furrow, 30-40 l of water/ha may be sufficient to dilute the preparation. Continuous circulation and mixing of the product in the container must be ensured throughout the whole procedure. The preparation must not be mixed with bactericides and fungicides! Use of the preparation is not recommended in case of strongly bound - clay loam, clay or saline clay - soils!





**Resid
MG**

**MICROGRANULATED
MYCORRHIZAL FUNGUS**








**The roadway of
nutrients**



COMPOSITION

Resid MG preparation contains *Glomus iranicum* var. *tenuihyparum* var. *nov.* mycorrhizal fungi. It is recommended to use the preparation together with **BIOFIL® products**, which can create a mutually beneficial effect.

BENEFITS OF USE

-  Establishes a mutually beneficial relationship with the plant.
-  With the help of mycelium production outside the roots, the plant has access to nutrients on a larger surface.
-  Spore formation outside the root.
-  It can also be used together with high concentration of fertilizers doses.
-  Increases plant nutrient and water absorption and photosynthetic activity.
-  It has a positive effect on the physiological activity and hormone balance of the plant.
-  Improvement of soil structure.

PROPOSED TECHNOLOGY

Resid MG is a micro-granulated (1 mm diameter), concentrated, mycorrhizal soil inoculant developed specifically for the treatment of field crops (excluding *Brassica* species). The product should be applied in the following crops at sowing in a **dose of 10 kg/ha**: winter and spring cereals, maize, rice, sorghum, grasses, sunflower, soya, cotton, lucerne, legumes. Avoid application together with fungicides and soil disinfectants.

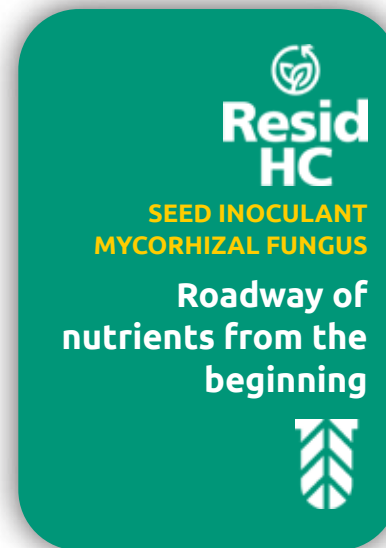


COMPOSITION

The preparation Resid HC contains the mycorrhizal fungus *Glomus iranicum* var. *tenuihyparum* var. *nov.* Synergistic effect was observed when used in combination with BIOFIL® products!

PROPOSED TECHNOLOGY

Resid HC is a microbiological seed inoculant in a concentrated (wetable powder) form that is suitable for seed treatment. The applied dose of the preparation is **1 kg** for the seed quantity to be sown **per hectare**. Prior to seed treatment it is recommended to wet the seed **with 1-2 % (w/w) water** to promote adhesion. The use of Resid HC is recommended mainly in the following field crops: winter and spring wheat, rye, barley, oat, triticale, maize, sunflower, soya and legumes. The preparation can also be used in combination with specific seed inoculants and other seed treatment preparations! When applied avoid combined use with fungicides and soil disinfectants.



BIOFIL[®]

EXTRA

ADDITIVE

The microorganism
doping



COMPOSITION

The “Extra” preparation contains nutrients, plant-origin sugars and various plant extracts necessary for the multiplication of bacteria and to ensure conditions of their life.

MECHANISM OF ACTION

The Extra additive allows the bacteria found in BIOFIL[®] preparations to spread faster and in greater numbers in the soil, as the preparation promotes their multiplication. At the same time, the ingredients, which are also beneficial for the whole soil microbiota, significantly help to mitigate negative impacts on soil life.

PROPOSED TECHNOLOGY

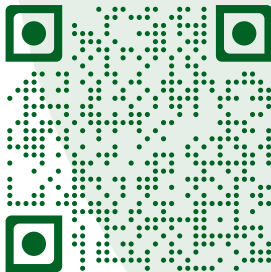
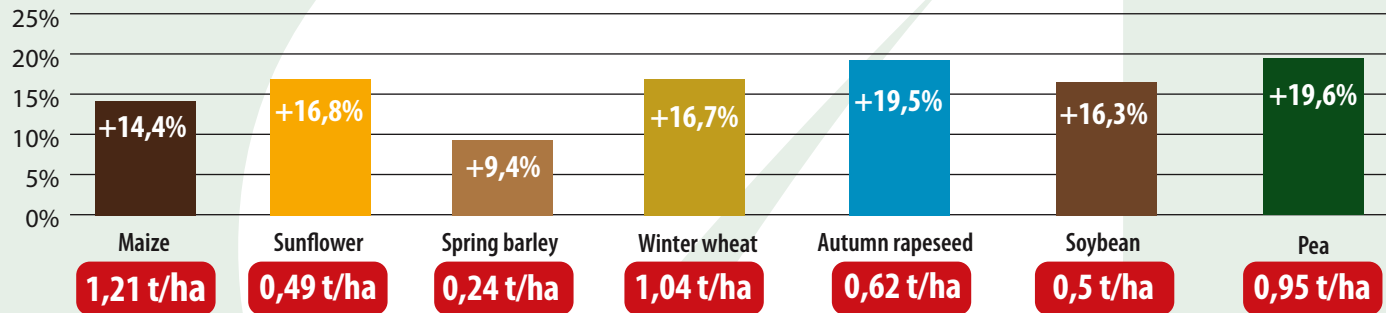
BIOFIL[®] Extra is recommended for all soil types and crops in combination with BIOFIL[®] products. Application: in arable and horticultural crops, **diluted with 50-400 l/ha water**, depending on the soil moisture content and the application equipment, sprayed on the soil in one pass during soil preparation or at the latest at sowing, then rotated into a depth of 5-10 cm. Recommended **dose of Extra: 1-2 l/ha** (min. 2 l/ha in case of horticultural crops and sandy soils with less than 1,5% organic matter content).



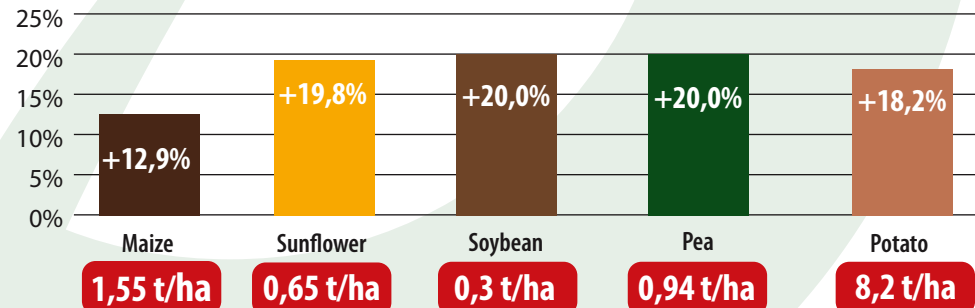
YIELDS INCREASE IN DIFFERENT CROPS

The following diagrams illustrate the impact of BIOFIL® products on the yields of the eastern and western parts of the Hungary. Experimental results of the last years (2014-2021) are presented aggregated by crops, and the yield increase is shown in t/ha and in percentage compared to the control.

Crop yields in western Hungary compared to the control



Crop yields in eastern Hungary compared to the control

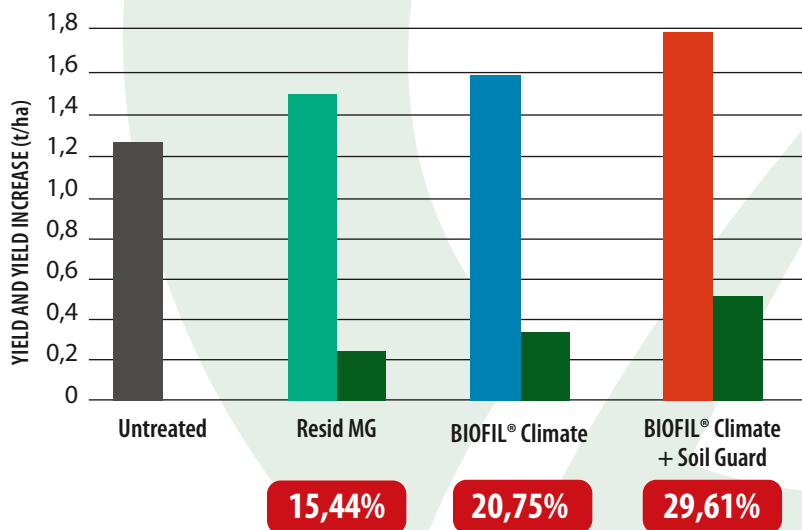


View our additional and detailed results according to the place of production on our website!

Our trial results

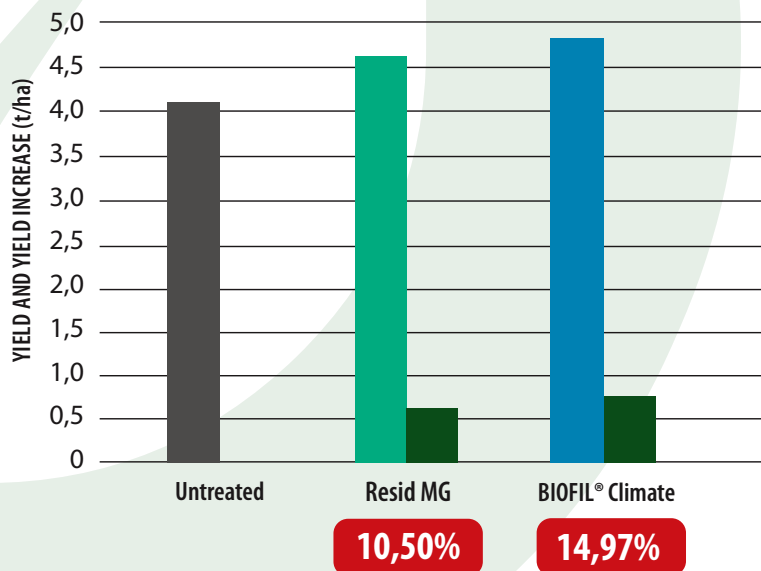
SUNFLOWER YIELD RESULTS, GYŐR, 2022

In 2022, Széchenyi István University of Győr conducted an independent, three replicate, small plot experiment with our soil improvement and soil health promoting products in sunflower on loamy sand soil. Despite the severe drought the results clearly show the significant impact of the treatment! The crop was not irrigated during the growing season! The treatments have resulted in a significant yield increase, BIOFIL® Climate and Resid MG increased the drought tolerance of the plants!

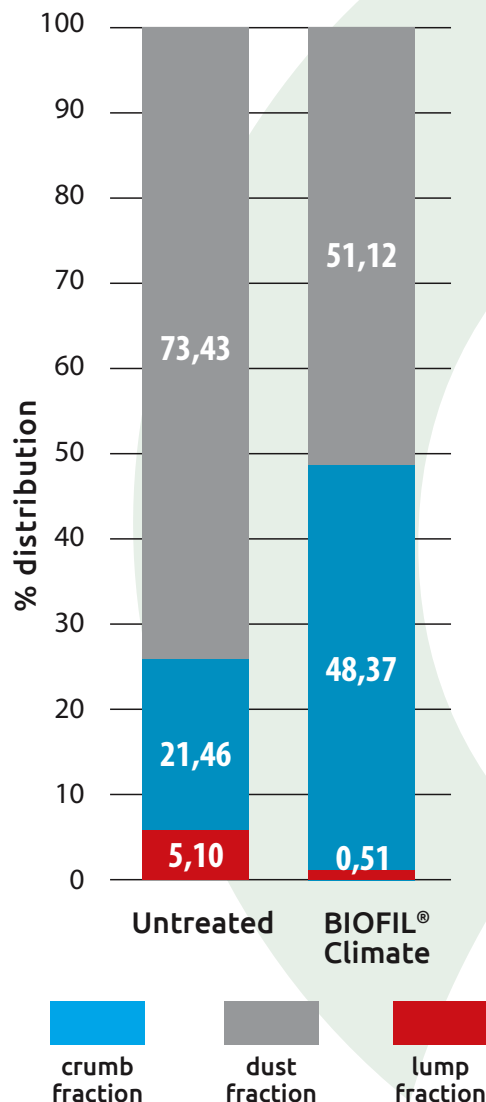


SUNFLOWER YIELD RESULTS, NYÍREGYHÁZA, 2022

Three replicated, independent small plot trials were carried out with sunflower at the AKIT Nyíregyháza Research Institute of the University of Debrecen, Nyíregyháza, Hungary. The soil in the experiment was very poor sandy soil and the plant stock was not irrigated during the growing period. Positive root mass development was observed in the study as a result of the treatment. Despite the drought, the treatments with Resid MG and BIOFIL® Climate increased the yields by 10-15%!



Topsoil aggregate: change in the proportion of dust, crumb and lump fractions as a result of the treatment.



Analysis of changes in soil structure

In a field experiment the ratio of topsoil aggregate: dust, crumb, lump fractions and their change under the effect of BIOFIL® Climate "A3" (1 l/ha) + BIOFIL® Extra additive (1 l/ha) was studied on chernozem soil at the University of Debrecen. **One treatment was enough to more than double the proportion of crumb fractions** as a result of which the amount of water stored in the soil increased by a similar proportion.

Yield enhancing effect of BIOFIL® Climate

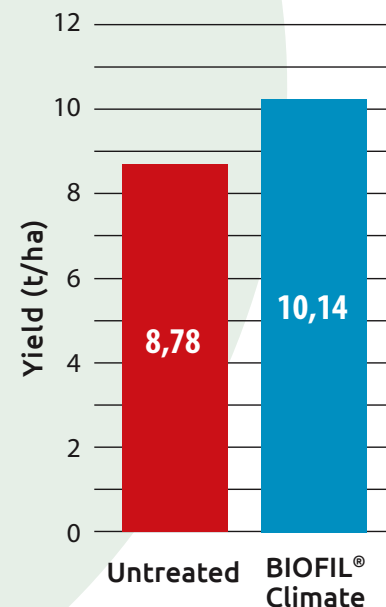
In 2019, we set up an independent small plot experiment to measure the yield increasing effect of BIOFIL® Climate "A3" (treatment: BIOFIL® Climate "A3" 1 l/ha + BIOFIL® Extra 1 l/ha) at the experimental site of Szent István University, Faculty of Agricultural and Economic Sciences, Institute of Agricultural Science and Rural Development in Szarvas. The figure clearly shows that the treatment **increased yields by 1.36 t/ha, or 15% on average**, in the four replicates compared to the control!

Additional studies were performed within the trial:

- **Measurement of soil resistance by penetrometer:** the degree of soil resistance in the treated plots was lower in the cultivated layer compared to the control plots.
- **Development of soil moisture content:** we obtained more favourable soil moisture values in the treatment plots than in the control plot.
- **Measurement of water permeability:** the water permeability of the treated plots (BIOFIL® Climate "A3" + BIOFIL® Extra additive) was improved.

Our trial results

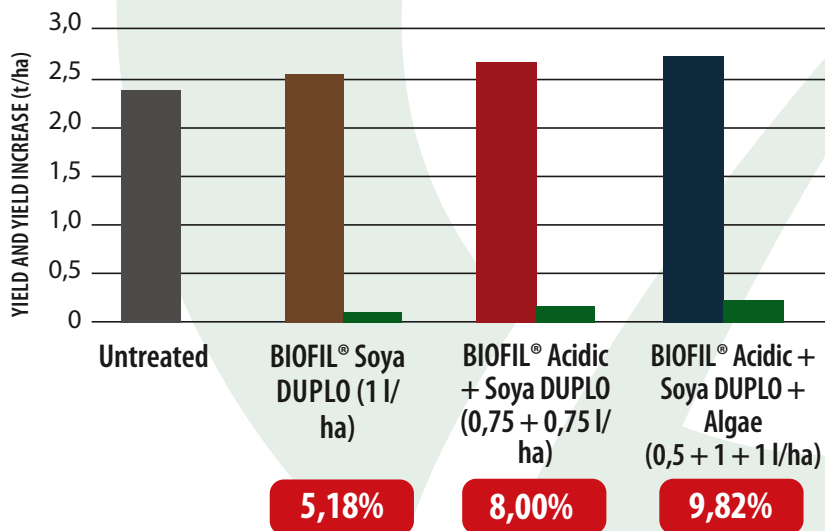
Small-plot, maize field trial on a degraded, deeply carbonated chernozem soil



Our trial results

SOYA YIELD RESULTS AND YIELD INCREASE, PÉCS

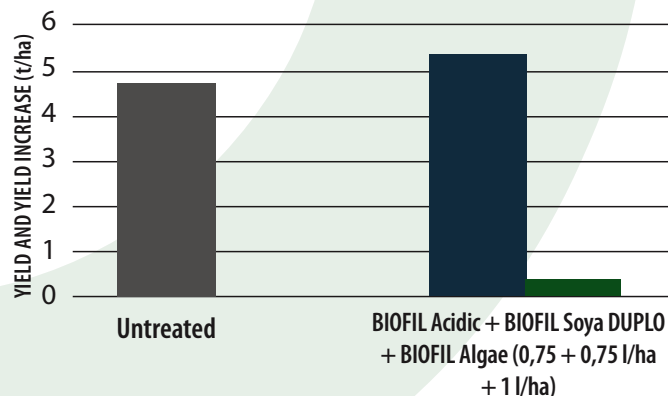
The new BIOFIL® Soya DUPLO formulation was studied in a trial conducted by NÉBIH in Pécs, Hungary. The independent small plot trial was performed in three replicates. The BIOFIL® Soya DUPLO treatments increased the number soya nodules compared to the control and the yields increased by 5-10%!



SOYA YIELD RESULTS AND YIELD INCREASE, PECIU NOU

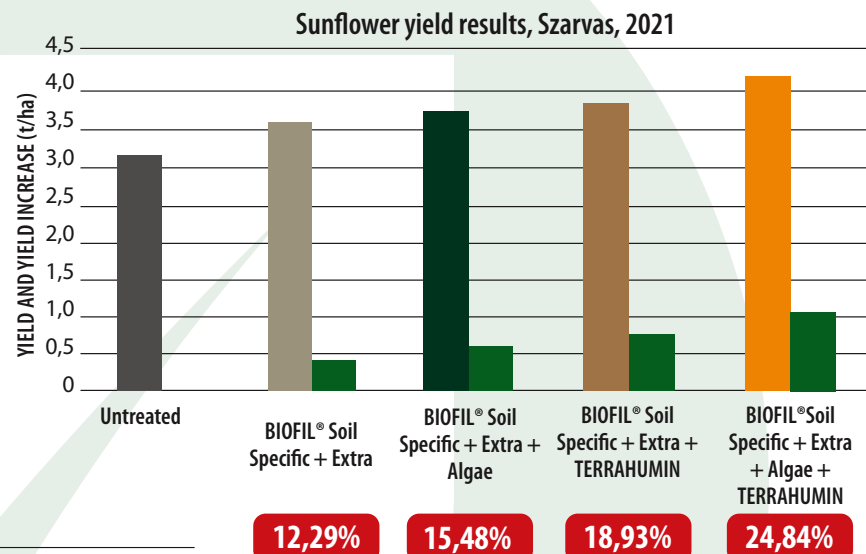
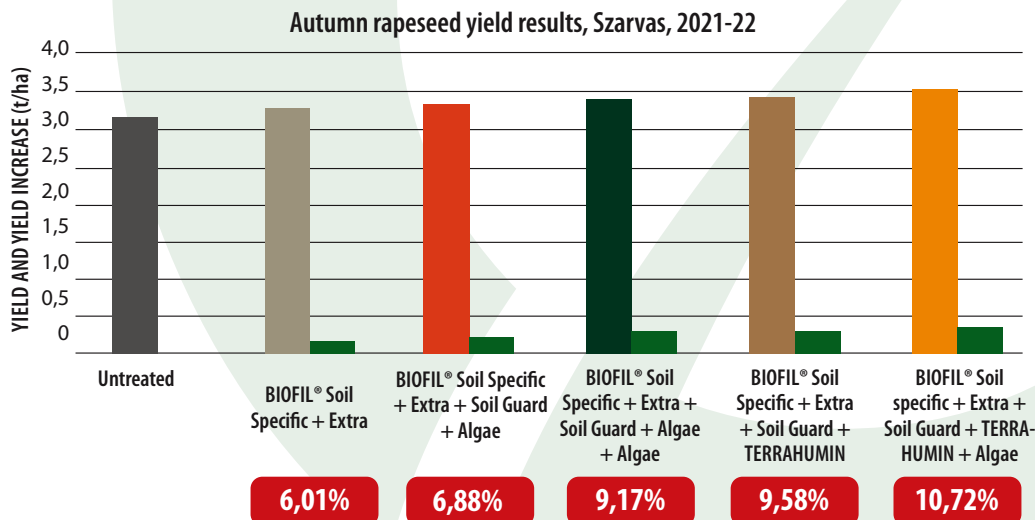
In Romania, we carried out an independent, small-plot, multiple-repetition test with specialists from the EUROFINS Agrosience Service in the year 2022 in the city of Peciú Nou, Romania.

In the study, despite the extremely hectic weather of the year 2023, very good yields were achieved on both the control and treated plots. From the experimental results, it is clear that the yield increased as a result of the BIOFIL® Soya Technology compared to the control, this is also shown by the increase in hectoliter weight. Even with good technology and adequate nutrient supply, the yield of the control technology was exceeded by 290 kg/ha (5.95 %) per hectare, despite the fact that the weather during the growing season was not ideal.



BIOFIL® TECHNOLOGY TEST RESULTS

Our maize and sunflower test results applying BIOFIL® Technology in independent, three replicate small plot experiments. The trials were carried out in collaboration with the Department of Irrigation and Land Improvement of MATE at Szarvas. The treatments were incorporated into a conventional farming technology, with irrigation as required. The treatments resulted in significant yield increases even applying excellent agrotechnology!



Recommended technologies

Autumn rapeseed

Climate

Soil Guard

Soil Specific

Post Harvest

Terrahumin

Algae

Terrahumin

Algae

Before or during sowing

Csirázás (BBCH 00-09)

Leaf development (BBCH 10-19)

Formation of side shoots, stem elongation (BBCH 20-39)

Flowering (BBCH 50-69)

Development of seeds, ripening (BBCH 70-89)

Sunflower

Climate

Soil Guard

Soil Specific

RESID MG,HC

Algae

Terrahumin

Algae

Post Harvest

Before or during sowing

Germination (BBCH 00-09)

Leaf development (BBCH 10-19)

Stem elongation (BBCH 30-39)

Inflorescence emergence (BBCH 50-59)

Flowering (BBCH 60-69)

Development of seeds, ripening (BBCH 70-89)

Cereal

Climate

Soil Guard

Soil Specific

RESID MG,HC

Post Harvest

Algae

Terrahumin

Algae

Terrahumin

Before or during sowing

Germination (BBCH 00-09)

Leaf development (BBCH 10-29)

Stem elongation, booting (BBCH 30-49)

Inflorescence emergence, flowering (BBCH 50-69)

Development of seeds, ripening (BBCH 70-89)

Pea

Pea

Climate

Soil Guard

Soil Specific

RESID MG,HC

Post Harvest

Algae

Algae

Before or during sowing

Germination (BBCH 00-09)

Leaf development (BBCH 10-19)

Stem elongation (BBCH 20-39)

Inflorescence emergence, flowering (BBCH 51-69)

Development and ripening of seeds (BBCH 70-89)

Maize

Climate

Soil Guard

Soil Specific

RESID MG,HC

Terrahumin

Algae

Algae

Post Harvest

Before or during sowing

Germination (BBCH 00-09)

Leaf development (BBCH 10-19)

Stem elongation (BBCH 30-39)

Inflorescence emergence, flowering (BBCH 50-69)

Development of seeds, ripening (BBCH 70-89)

Soybean

Soya Duplo

Climate

Soil Guard

Soil Specific

RESID MG,HC

Algae

Terrahumin

Terrahumin

Algae

Before or during sowing

Germination (BBCH 00-09)

Leaf development (BBCH 10-19)

Formation of side shoots, Development of harvestable vegetative plant parts (BBCH 20-50)

Inflorescence emergence, flowering (BBCH 51-69)

Development and ripening of seeds (BBCH 70-89)

FUNCTIONS OF THE STRAINS IN THE PREPARATIONS

The table below shows certain functions of the bacterial and mycorrhizal strains found in the products marketed by Terragro Ltd. As it can be seen from the table, in many cases a strain can have more than one function. These properties are tested separately for each strain using the appropriate microbiological methods, and the properties of the strains are summarized in a detailed table. During product development, the strains are added to the formulation based on these databases depending on which property of the product the researchers want to enhance by the given strain. Of course, particular attention is given to using such strains in the formulation that provide the highest possible efficiency without influencing each other's viability or effectiveness.

	ACIDIC	NORMAL	ALKALINE	PEA/SOYA DUPLO	POST HARVEST	ALGAE	SOIL GUARD	CLIMATE	RESID HC, MG
Nitrogen fixation	<i>Azospirillum largimobile</i> <i>Azospirillum brasilense</i> <i>Paenibacillus peoriae</i>	<i>Azospirillum</i> <i>brasilense</i> (3x) <i>Azospirillum largimobile</i>	<i>Azospirillum irakense</i> <i>Azospirillum brasilense</i> <i>Azospirillum largimobile</i>	<i>Rhizobium</i> <i>leguminosarum</i> / <i>Bradyrhizobium sp.</i> , <i>Ensifer sp.</i>	<i>Azotobacter</i> <i>chroococcum</i>	<i>Azotobacter vinelandii</i> <i>Azospirillum canadense</i>		<i>Azospirillum sp.</i>	
Plant hormone production	<i>Azospirillum largimobile</i> <i>Paenibacillus peoriae</i> <i>Agreia pratensis</i>	<i>Azospirillum largimobile</i> <i>Kocuria rosea</i> <i>Arthrobacter</i> <i>crystallopoietes</i>	<i>Azospirillum largimobile</i> <i>Arthrobacter</i> <i>crystallopoietes</i> <i>Pseudomonas chlororaphis</i>			<i>Azotobacter vinelandii</i> <i>Azospirillum canadense</i> <i>Bacillus proteolyticus</i> <i>Chlorella vulgaris</i> <i>Chlorella zofingiensis</i>		<i>Azospirillum sp.</i> <i>Kocuria sp.</i> <i>Pseudomonas sp.</i>	
Nutrient mobilisation	<i>Pseudomonas</i> <i>frederiksbergensis</i> <i>Bacillus aryabhatai</i> <i>Agreia pratensis</i> <i>Paenibacillus peoriae</i>	<i>Pseudomonas jessenii</i> <i>Arthrobacter</i> <i>crystallopoietes</i> <i>Kocuria rosea</i>	<i>Pseudomonas chlororaphis</i> <i>Bacillus aryabhatai</i> <i>Arthrobacter</i> <i>crystallopoietes</i> <i>Pseudomonas jessenii</i>		<i>Brevundimonas</i> <i>mediterranea</i>	<i>Azospirillum canadense</i>	<i>Bacillus sp.</i>	<i>Pseudomonas sp.</i> <i>Kocuria sp.</i>	<i>Glomus iranicum</i> var. <i>tenuihypharum</i>
Soil structure improvement	<i>Paenibacillus peoriae</i>	<i>Kocuria rosea</i>	<i>Pseudomonas chlororaphis</i>					<i>Pseudomonas sp.</i> <i>Kocuria sp.</i>	<i>Glomus iranicum</i> var. <i>tenuihypharum</i>
Plant protection functions	<i>Azospirillum largimobile</i> <i>Pseudomonas</i> <i>frederiksbergensis</i> <i>Agreia pratensis</i> <i>Bacillus aryabhatai</i> <i>Bacillus simplex</i>	<i>Azospirillum largimobile</i> <i>Pseudomonas jessenii</i>	<i>Azospirillum largimobile</i> <i>Pseudomonas jessenii</i> <i>Pseudomonas chlororaphis</i>	<i>Ensifer sp.</i>		<i>Azotobacter vinelandii</i> <i>Azospirillum canadense</i> <i>Chlorella zofingiensis</i> <i>Bacillus proteolyticus</i>	<i>Bacillus sp.</i>	<i>Pseudomonas sp.</i> <i>Azospirillum sp.</i>	
Stem decomposition	<i>Paenibacillus peoriae</i>				<i>Brevundinonas</i> <i>mediterranea</i> <i>Cellvibrio fibrovorans</i> <i>Achromobacter spanius</i>				

TERRAGRO
Trading Ltd.

Hungary, 1095
Budapest, Soroksári út 48-54.
Phone: +36 (1) 793 2670
E-mail: info@terragro.hu



www.terragro.hu