

# Pixel

STIMULATES  
DESALINATES  
ACIDIFIES



+ safety



+ production



+ quality



## Produce more with healthy methods!

The Green Path project is Agriges' answer to the new challenges of modern farming. Through the collaboration of Agriges with research institutes, experimental centres, universities, cooperatives and farms, the focus of the Green Path project is on supplying technical means which result in abundant and sustainable production from an environmental point of view and safe for food: **produce more with healthy methods.**



+ safer



+ sustainable



+ production



+ quality



- chemicals



- pollution



## Probiotic microbial consortia for sustainable agriculture



**BENE  
VEGE  
FIT**

In 2018, the BENEVEGEFIT project was created from the partnership between Agriges and the Department of Agriculture of the Federico II University of Naples, aimed at the research **of biostimulating microbial consortia**, with PGPR activity and rhizosphere competence towards agricultural crops. Using the innovative approach of plant microbiome engineering, this research programme falls under the field of biotechnological science and agrifood, earmarked as priority research topics for agriculture by the National Smart Specialisation Strategy (NSSS) and approved by the European Commission for the development of companies operating in the agrifood sector.

DIPARTIMENTO di  
AGRARIA



# Salinity and excess sodium

**Climate change, desertification, limited water resources, poor drainage and rising groundwater** are some of the natural causes of the accumulation of salts in the surface layers of the soil. In recent years, however, human activity has had a significant impact on this phenomenon mainly due to poor irrigation management (use of marginal-quality water or insufficient irrigation volumes) and fertilisation (either excessive or with poor quality products).

The excessive accumulation of salts in the soil, especially sodium, is one of the most difficult environmental phenomena to manage and the most harmful for natural ecosystems, agricultural production and food safety, because this process:

- 1** limits the growth of plants;
- 2** degrades the physicochemical properties of the soil;
- 3** reduces the biodiversity and activity of microorganisms in the soil.

Agricultural crops are significantly impacted by **salinity** and **sodium**. Indeed, an increase in salt in the circulating solution makes it more difficult for plants to absorb water (**osmotic effect**), resulting in a reduction in cell turgor and the slowing down of growth processes. The increase in salinity in the plant causes cell damage (**phytotoxic effect**) and, in the worst cases, the death of plant tissues (**drying of the roots and necrotic leaves**).

In the soil, salinity alters the **Cation Exchange Capacity** and **worsens its physical** (deflocculation, compaction and erosion) and **chemical characteristics** (imbalances in root absorption of water and nutrients). Moreover, when the soil contains large concentrations of **sodium**, the loss of structure results in less water being able to pass through it, leading to water stagnation and anaerobic conditions. These conditions decrease or prevent the activity of **aerobic microorganisms** on which the decomposition of organic matter depends, which is consequently reduced.



**Decrease  
in growth**



**High expenditure of  
energy to absorb water,  
nutrients and eliminate  
excess sodium**



**In the worst cases, severe  
wilting and tissue  
death**

# ThioBac

## Agriges technology against salinity and soil fatigue

ThioBac stems from the joint research between **Agriges** and the Department of Agriculture of the **Federico II University of Naples**, aimed at the bioactivation of the plant metabolism and a reduction in production losses, even in the case of severe abiotic stress, such as osmotic shock. The heart of the technology is the synergy between the exclusive siderophores developed as part of the **BENEVEGEFIT** project and organic matter and mineral matrices:



### Siderophores and PGPR

**Bacillus megaterium S3Nb3** is an exclusive bacterial strain, isolated and deposited by Agriges in an international reference microbial collection capable of:

- **producing siderophores**, molecules with high affinity for iron, which chelate and make it more assimilable by the plant;
- **solubilizing phosphorus** locked in the soil;
- stimulate the **well-being** of the plant.



### Organic acids

The **organic acids** contained in ThioBac, separate and create complexes of the sodium in the soil, suspending it again in the circulating solution and aiding its removal. They also lower the conductivity of the soil and release calcium, which replaces sodium, thus improving the structure of the soil.



### Atomised sulphur

**Atomised sulphur** (with an average particle diameter of: 100  $\mu\text{m}$ ) is the optimal corrective and desalinating element since, once in the soil, it undergoes bio-oxidation into **sulphuric acid** which helps to rebalance the pH, release calcium in the soil and eliminate excess salts in the soil.



### Iron

The presence of freely available iron guarantees an immediate improvement in the state of well-being of the crop, **greening** up vegetation and stimulating the formation of **photosynthetic** compounds.

# Pixel

Stimulates, desalinates, acidifies



Pixel is the Agriges solution against salinity and soil fatigue. ThioBac technology and the intrinsic features of its components make it ideal for improving low-oxygen, saline and exhausted soil. In fact, Pixel:

- 1 acidifies and desalinates;
- 2 restores nutrients blocked in the soil to the solution;
- 3 boosts the development of new roots;
- 4 stimulates the activity of microorganisms in the soil and the efficacy of water use;
- 5 greens up plants and increases the amount of iron that can be assimilated.

## Composition

Organic Nitrogen (N)	1,0 %	Organic carbon (C)	18,0 %
Total Sulphur (S)	21,0 %	Organic substance with nominal molecular weight < 50 kDa	30,0 %
Total Iron (Fe)	1,0 %	Bacillus megaterium S3Nb3*	1,0 x 10 <sup>6</sup> UFC/g

**Raw materials:** brown algae, plant-based organic products and by-products, elemental sulphur, iron salt (sulphate).  
**Product bioactivated with ThioBac technology.**

\* Not shown on the label.

## Bacillus megaterium S3Nb3

An exclusive bacterial isolate, identified in the BENEVEGEFIT project, for its special ability to:

- solubilise phosphorus;
- produce siderophores.

In the soil, this microorganism restores the naturally present but insoluble phosphorus to the solution, so that the plant forms new roots. Moreover, Bacillus megaterium S3Nb3 **stimulates and greens up** the plant by making a **greater quantity of iron** available to it.

**Bacillus megaterium S3Nb3 is an exclusive strain isolated and deposited by Agriges in an international reference microbial collection.**

## Doses and methods

Crops	Soil type	Applications	Dose l/ha
ALL CROPS	Clay	2 applications from the first growth stages	20-25
ALL CROPS	Sandy	2-3 applications from the first growth stages	15-20

## Field results

The stimulating, desalinating and acidifying activity of PIXEL has been analysed and verified through numerous **experimental and field tests**. The following tests were conducted by the **FTS (Field Technical Service)** team.



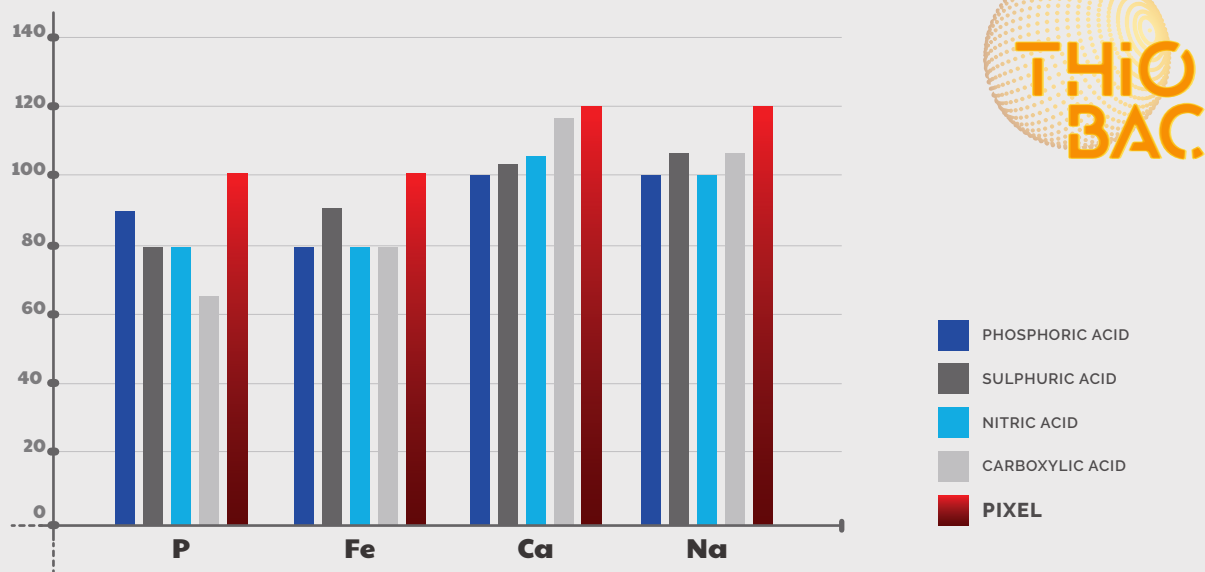
### Goal

Assessment of the **ability to restore** some of the **main nutrients** blocked in the soil to the solution.

**Five comparisons were made:** four different acids (phosphoric acid, sulphuric acid, nitric acid, carboxylic acid) and Pixel (in fertigation with a dose of 20 litres per hectare).

Results: compared to the other applications, the application of Pixel induced a series of chemical reactions in the rhizosphere which resulted in the mobilisation of a greater amount of previously unavailable nutrients in the circulating soil solution.

**Mobilisation index of elements in the soil**



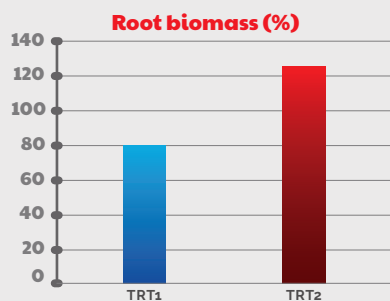
### Goal

Assessment of the efficacy of the application of Pixel on the rooting (post-transplant) of the cherry tomato cultivar. Casarino tomato in conditions of high salinity in the soil and irrigation water.

**Two comparisons were made:** TR1 (untreated) and TR2 (Pixel in fertigation with a dose of 20 litres per

hectare). The application was carried out in the post-transplant stage (BBCH20).

**Results:** shortly after Pixel was applied, the root system of the treated plants showed greater development, resulting in increased resistance of the plant to saline stress due to the high salinity of both the soil and the irrigation water used.



**Control**



**Pixel**

# Experimental results

The research activity, the results of which are shown below, was conducted **by the University of Mediterranean Studies of Reggio Calabria on Actinidia**, Hayward cultivar, to assess the efficacy of the application of Pixel on vegetative and productive parameters.



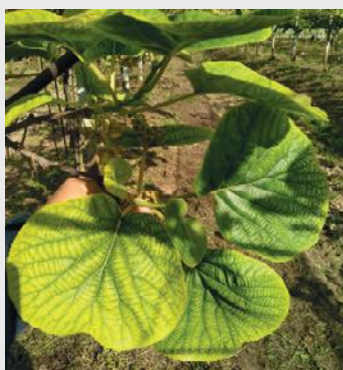
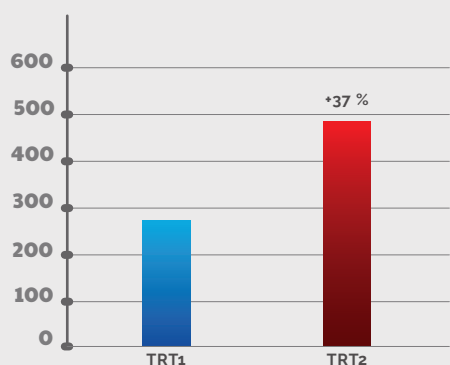
Università degli Studi  
Mediterranea  
di Reggio Calabria

**Two comparisons were made:** TR1 (untreated) and TR2 (Pixel in fertigation with 20 litres per hectare).

The application was carried out during the shoot development stage (BBCH 18).

**Results:** Shortly after the first application, the treated plants were decidedly greener, showing a significant reduction of chlorotic patches compared to the untreated plants. This was further supported by the iron content in the leaves which was 37% higher in plants treated with Pixel than in untreated ones.

## PPM of iron in the leaf



Pre-application (7-5-21)



Post-application (13-5-21)

## AVVERTENZE

If mixed with other products, it is advisable to carry out miscibility and compatibility tests beforehand on small surface areas. We do not recommend associating this product with products with an alkaline reaction (e.g. polysulphides) and any products that cannot normally be mixed with sulphur.

**Shake well before use.**

**Formula**  
water-dispersible  
fluid

**Packaging**  
5 - 10 - 20 l

**Density (T=20°C)**  
ca. 1280 kg/m<sup>3</sup>

**pH**  
(sol. 6%)  
ca. 4,0

**Conductivity**  
(sol. 10%)  
ca. 9,17 dS/m



Allowed in organic  
farming



Fertigation



ThioBac  
Exclusive Agriges technology



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