agriges

# AZOSMART

## The smart Nitrogen


+ safety

+ sustainability

+ production

agriges

Green Path

## Produce more produce healthy!

Green Path is Agriges' practical response to the challenges of modern agriculture. The focus of the Green Path project is to provide technical means for abundant, environmentally sustainable and food-safe production: produce more, produce healthy.

The project involves Agriges working with research institutes, experimental centres, universities, cooperatives and farms to develop products that maximise yields, thereby reducing the use of potentially polluting chemical substances.

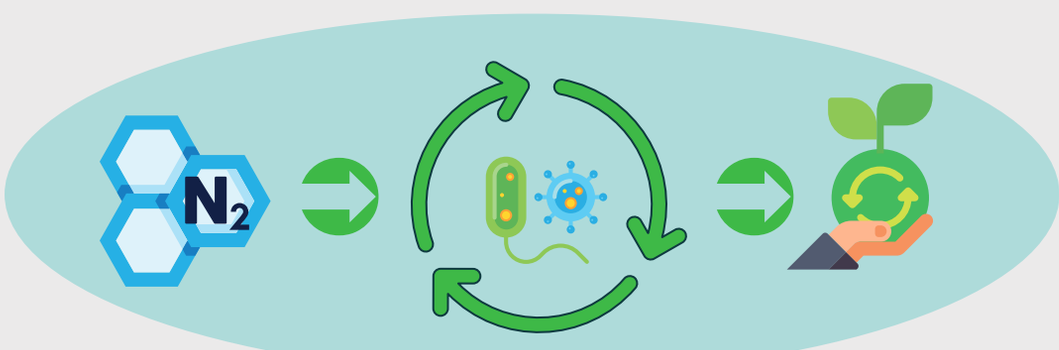
**+ safety** **+ sustainability** **+ production** **+ quality** **- chemical** **- pollution**

# OBJECTIVE:

### An innovative approach to nitrogen fertilisation

With the 'Farm to Fork' strategy at the heart of the Green Deal, the European Union has embarked on a course of action that aims, among other measures, to reduce by 2030 the nutrient losses occurring in the environment due to the excessive use of chemical fertilisers by at least 50%; this will involve **reducing the use of fertilisers by at least 20%.** In this context, worsened, moreover, by strong climate change and unstable commodity prices, it is more necessary than ever to review the fertilisation of agricultural crops with an innovative and sustainable approach with the aim of **maximising the plant's ability to assimilate nutrients, especially nitrogen**.

Nitrogen is an essential nutrient for plant growth, due to the high amount used, and is **the most abundant gas in the earth's atmosphere, of which it makes up about 78%**. In gaseous form, nitrogen cannot be absorbed directly by the plant, which in nature must instead make use of the nitrogen present in the soil. Within the soil, the plant's ability to assimilate nitrogen varies depending on its availability in the circulating solution; the share of **absorbable nitrogen is limited and subject to loss or immobilisation of various kinds:** percolation and/or leaching, adsorption to the surfaces of clays and organic matter, volatilisation, etc.




**- chemical + sustainability + production**

# AZO SMART

## A unique microbial consortium

Azo Smart is a concentrate of exclusive microbial strains from the Agriges Research and Developement, registered in an international reference microbial collection and selected for their high capacity **to fix atmospheric nitrogen and promote plant photosynthesis.**

The goal is increased nitrogen availability for the crop and improved fertiliser use efficiency. This is achieved through the 'multi-site' synergy between the unique Azo Smart consortium and the crop, which is stimulated to photosynthesise more efficiently and maximise production performance.


***Azospirillum brasilense* AGS608***

Biological nitrogen fixation at foliar and root level

***Bacillus amyloliquefaciens* AGS282***

Induction of plant growth thanks to the synthesis of natural hormones (auxins, giberellins)

***Azotobacter chrococcum* LS132***

Photosynthesis enhancer, producer of ammonia, with direct effects on the increase in yields

***Mycorrhizae (Glomus spp.)***

Increased exploration and root development

***Trichoderma longibrachiatum* AGS799***

Production of metabolically active substances that perform an anti-stress activity on plant

*** Exclusive strain isolated and deposited by Agriges in an international reference microbial collection.**

# EXCLUSIVE PRODUCTION TECHNOLOGY

The microorganisms contained in Azo Smart were isolated, identified and characterised following the intensive collaborations of Agriges with Italian and international research institutes and universities. The best microorganisms capable of performing intensive **atmospheric nitrogen fixation and Plant Growth Promotion** activities were chosen for Azo Smart

micotech®
new active ingredient

| Microorganism | Action | Effect on the plant | Agronomic Advantage |
|---|---|---|---|
| **Arbuscular mycorrhizal fungi** | | | |
| ***Glomus spp.*** | A fungus that forms a symbiotic association with the roots of most crops, which helps in phosphorus supply and protects them from stress | • Stimulation of root growth<br>• Increased water and nutrient interception | • Increased resistance to stress<br>• Reduced chemical fertiliser inputs |
| **Plant growth-promoting rhizobacteria** | | | |
| ***Azotobacter chrococcum*** **LS132*** | Nitrogen-fixing bacterium capable of producing a durable and sustainable source of ammonia nitrogen for the plant, with both foliar and root action. It is also capable of stimulating plant photosynthetic activity. | • Biological nitrogen fixation<br>• Increased photosynthetic activity | • Reduction of chemical fertiliser inputs<br>• Stimulating plant growth |
| ***Azospirillum brasilense*** **AGS608*** | Bacterium capable of spreading within the plant parenchyma, fixing atmospheric nitrogen and making it readily available to the crop. It also produces phytohormones (IAA) that stimulate root growth and functionality. | • Biological nitrogen fixation<br>• Photosynthetic accelerator | • Reduction of chemical fertiliser inputs<br>• Stimulating plant growth |
| ***Bacillus amyloliquefaciens*** **AGS282*** | Bacterium capable of settling and multiplying very quickly on all plant organs, behaving as a 'substrate competitor'. It also produces natural hormones (especially auxins) by stimulating plant growth and stress resistance mechanisms. | • Plant growth stimulation<br>• Plant well-being stimulator | • Increased resistance to stress<br>• More rational input of technical means |
| **Selected fungal isolates** | | | |
| ***Trichoderma longibrachiatum*** **AGS799*** | Fungus characterised by a strong ability to adapt to all surfaces (roots, stem and leaves) and with very rapid growth. The symbiosis with this microorganism stimulates the root system exponentially. It is also capable of producing siderophores and indolacetic acid (IAA). | • Increased water and nutrient uptake<br>• Photosynthetic accelerator | • Increased resistance to stress<br>• Stimulation of plant growth |

# EXPERIMENTAL RESULTS

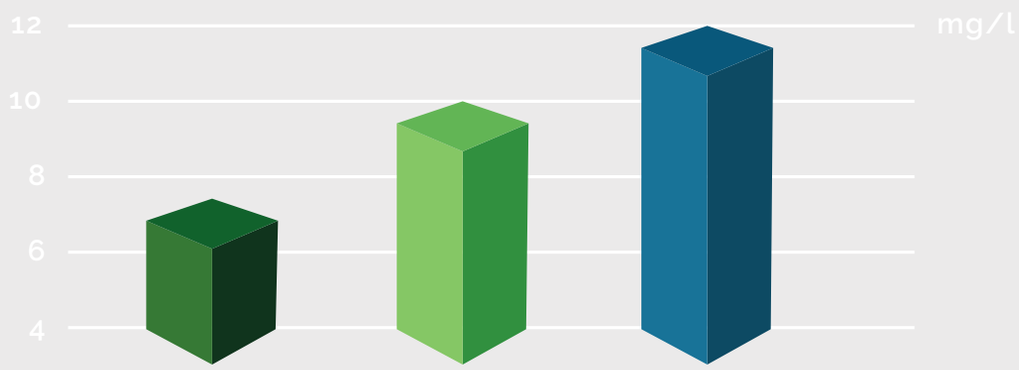
## Identification and characterisation of micro-organisms Plant Growth Promotion

During the Research and Development activities conducted by Agriges in collaboration with Italian universities, microbiological research laboratories and foreign research institutes, the microorganisms contained in AZO SMART were **identified and characterised** for their Plant Growth Promotion, resistance to environmental stresses and ability to fix atmospheric nitrogen assimilating nutrients, especially nitrogen.

The results showed that, in a microbial collection of bacteria belonging to different genera (*Bacillus, Azotobacter, Pseudomonas*) characterised by strong PGP action, the micro-organism Agriges *Azotobacter chrococcum* strain LS132 **was the one releasing the highest amount of ammoniacal nitrogen**, an indicator of nitrogen fixation activity,compared to the other strains analysed.

| Company | Code | Species | Thesi |
|---|---|---|---|
| --- | RHF6 | ***Bacillus amyloliquefaciens*** | RHF6 |
| --- | RHFS10 | ***Bacillus vallismortis*** | RHFS10 |
| Agriges | LS132 | ***Azotobacter chrococcum*** | LS132 |

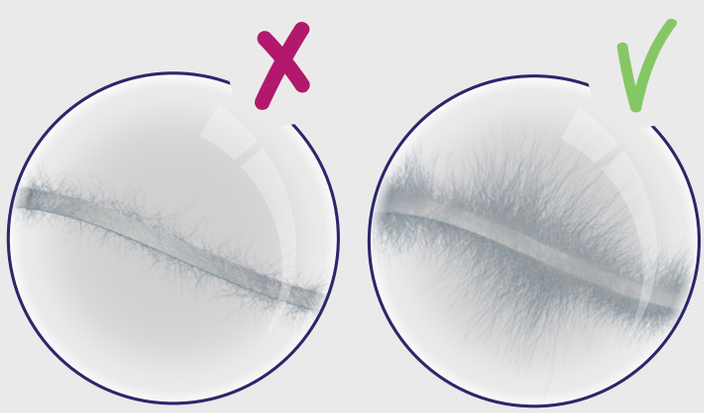
### Bacterial activity/ammonia production




# ROOT GROWTH STIMULATION

Further results also highlighted the synergistic effect of the microorganisms chosen by Agriges for the product Azo Smart in the biostimulation of the root system. Indeed, it was seen that the association of *Azotobacter chrococcum* strain LS132 and *Bacillus amyloliquefaciens* strain AGS282:

- produces seedlings with longer primary roots on average;
- influences the number of lateral rootlets;
- improves resistance to environmental stresses (especially drought).



## COMPOSITION

**Rhizosphere bacteria (selected bacterial isolates) including**

| | |
|---|---|
| *Azotobacter chrococcum* LS132* | 1.0 x10$^8$ CFU/g |
| *Azospirillum brasilense* AGS608* | 1.0 x10$^8$ CFU/g |
| *Bacillus amyloliquefaciens* AGS282* | 1.0 x10$^8$ CFU/g |
| **Organic soil improver:** simple, non-composted vegetable soil improver | |
| *Mycorrhizae (Glomus spp.)* | 5% |
| **Selected fungal isolates including:** | |
| *Trichoderma longibrachiatum* AGS799* | 1.0 x10$^7$ CFU/g |

* Exclusive strain isolated and deposited by Agriges in an international reference microbial collection

## DOSES AND INSTRUCTIONS FOR USE

| Crops | Foliar application | Dose g/ha | Reduction of Fertilizer Units (Nitrogen) |
|---|---|---|---|
| TREE CROPS | During the growth phase | 350 | 30-35 units* |
| HORTICULTURAL CROPS | During the growth phase | 350 | 30-35 units* |
| INDUSTRIAL CROPS | Throughout the entire vegetative cycle | 350 | 30-35 units* |
| CEREALS | End of tillering - beginning of shoot emergence | 350 | 30-35 units* |

The aforementioned doses have a purely indicative value and can therefore vary in relation to the soil and climate features of each area.
*Indicative values, they may vary according to the soil and climate characteristics of each area and the overall state of well-being of the crop.

## WARNINGS

The product contains living microorganisms, present in spore-forming form, resistant to temperatures down to -20°C. With temperatures between 8 and 30 °C, the growth of the microbial consortium increases exponentially. Avoid inhaling dust. Agriges declines all responsibility for incorrect storage and/or handling.

**Formulation**
wettable powder

**Packages**
0,7 - 1,4 - 2,8 - 5,6 kg

**pH**
approx. 6,8

**Conducibility**
approx. 18,2 dS/m

MICO TECH — Exclusive Agriges production technology

Foliar Application

BIO — Allowed in Organic Farming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