

MADE IN FRANCE

BIO-SOLUTIONS
ENVIRONMENTAL TOOL

SOIL ACTIVATOR



Agro**nut**rition



BioFertiliser
technologies

MODIFICATION OF AGRICULTURAL METHODS

Strongly linked to environmental pressure

AWARENESS

- / In connection with the fight against climate change
- / Human health
- / The preservation of the environment

=> ADAPTATION OF AGRICULTURAL PRACTICES

In particular on the NITROGEN factor already subjected to influenced pressures through environmental policies

- / Starting point: European directive / regulation
- / Proposed nitrogen taxation projects

- / Nitrogen inputs constrained and limited
- / Preliminary manure plan (PPF)
- / Practical registration booklet (CEP)

Future

/ in a short time :
increased control of phosphorus flux

Limiting factors of eutrophication
Ex from the Netherlands: limit of inputs to
48 kg P / ha / year (109 kg P₂O₅)

Agro nutrition

Our answer to
Current issues

SOIL
ACTIVATOR

/ INCREASE THE NATURAL
NITROGEN CONTENT IN SOIL

/ INCREASE CAPTATION OF
NITRATES (Reduce N leaching)

/ INCREASE SOLUBILISATION OF
PHOSPHORUS FROM SOIL

100%
ALIVE
0%
CHEMISTRY

BIO-SOLUTIONS

MADE IN FRANCE

BIO-SOLUTIONS
ENVIRONMENTAL TOOL

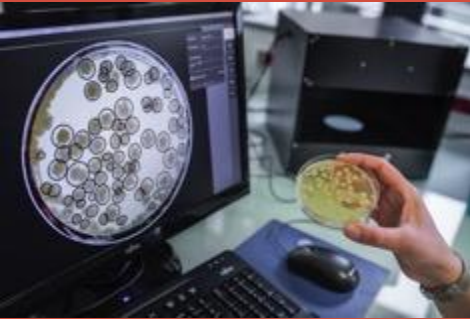
N

AMYLLIS

Agro nutrition

BioFertiliser
technologies

BIOFERTILIZING PRODUCTION REQUIRES KNOW-HOW, EXPERTISE AND MEANS.



KNOW-HOW

Screening and characterization of bacteria
by family and functions
(*Phosphorus solubilization, nitrogen fixation, MO mineralization ...*)

Biodiversity description of soils
(Molecular analyses)

In vitro Production of
Mycorrhizal Fungi

Microorganisms formulation
(liquide, micro granules...)

Quality control (stability and quality of products, absence of contaminants and pathogens)

In Vitro Trials of strains of interest

EXPERTISE

Soil Microbiology

Molecular biology

Plant Physiology

Pilot and industrial production of
Microorganisms of interest

Experimentation on model plant

Collaboration with academic
laboratories

R&D investments :

A part of the CA Agronutrition is dedicated to research and innovation
Participation in numerous collaborative projects (Ensiacart, Inra, CNRS...)

MEANS & SKILLS

1000 m² of laboratory

Culture tent

Greenhouses

2 specialized doctors in soil life

Materials investments:

Fermenter, binocular loupe, PCR, PSM, Centrifuge, Spectrophotometer ...

Human investments:

5 people in Mycorhize department
4 people in Bacteriology department



Agro nutrition

9 YEARS

OF SOIL RESEARCH
& ITS NATURALS CAPACITIES

TO ISOLATE, CHARACTERIZE
& TO SELECT BACTERIA OF INTEREST

Result : SOUCHOTHÈQUE OF **350 BACTERIA**
identified for their singular properties

2 BACTERIAL STRAINS

RELIABLE FOR FIXING THE NITROGEN.

Indeed, many fixing nitrogen bacteria exist in the nature. However, they don't possess the same potential of fixing and abundance in the soil.


In this product, we selected two high potential bacteria for atmospheric nitrogen fixation but also two bacteria that are found in most soils

Target : Enhance their implantation after the product application

These two bacteria have similar properties but different tolerances to pedoclimatic conditions. Moreover, their optimal temperature of development is different. The goal is to optimize the implantation and the development by covering all possible situations related to the temperature, pH and soil type.



N
AMYLIS



OPTIMIZED SYNERGY
for **ALL TYPES OF SOIL**

**SOIL LIFE STIMULATION
& CROP NUTRITION.**

Agro**nutrition**

AMYLLIS

0% CHEMISTRY

**MADE FROM NITROGEN-FIXING BACTERIAS,
AMYLLIS IS AN INNOVATIVE TECHNOLOGY THAT
WILL ENABLE TO ACTIVATE THE LIFE OF THE SOIL.**

This activation will benefit to bacteria population (maintenance of soil life) but also to crops (especially through the fixation of atmospheric nitrogen).

100%

**MADE IN FRANCE
ALIVE AND
USABLE IN ORGANIC FARMING**

Biofertiliser from *Bacillus amyloliquefaciens*

2 strains I4995 and I4996 (from Pasteur Institute)
To cover most of situations

Form : Bacterias liquid suspension
Concentration : 10^9 UFC/mL

BioFertiliser
technologies

SOIL LIFE STIMULATION & CROP NUTRITION.



AMYLIS

Crops



Environment



Soil



SOIL LIFE STIMULATION & CROPS NUTRITION.



AMYLIS

FUNCTION

1. CROP RESIDUES DEGRADATION



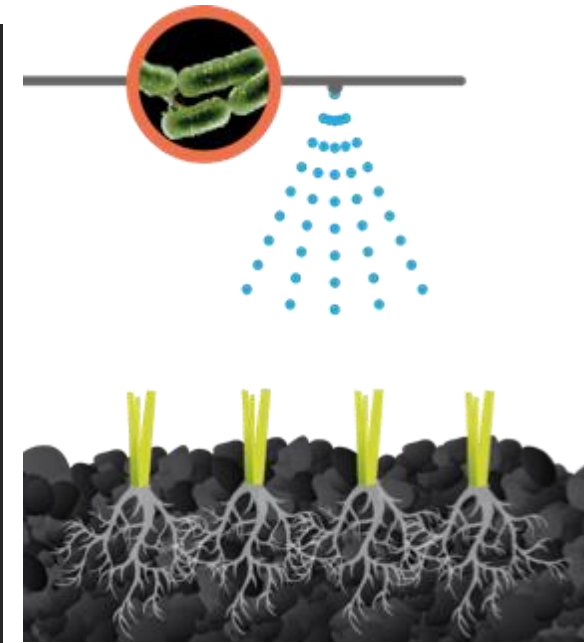
AGRONOMIC ADVANTAGES

- / Limiting soil erosion
- / Structuration and soil porosity

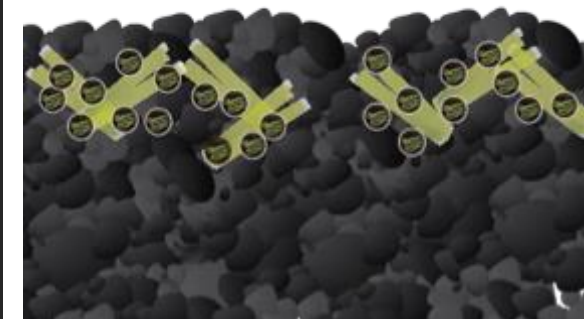
AFTER HARVEST, AMYLIS IS APPLIED ON CROP RESIDUES

CROP RESIDUE IS THE FIRST
FEEDING SOURCE FOR BACTERIA.
Supply the energy for bacteria
population multiplication.
/ Lignin and cellulose → ATP
/ Organic N fixation.

superficial incorporation of
residues promotes contact with
soil and thus accelerates their
decomposition for improving
soil organic fertility
and structural stability.



**FOR THE FARMER
IT IS THE INSURANCE TO
VALUE THE CROP RESIDUES.**



SOIL LIFE STIMULATION & CROPS NUTRITION.



AMYLLIS

FUNCTION

2. MINERALIZATION OF ORGANIC MATTER



AGRONOMIC ADVANTAGES

- / Crop --> Nutrition
- / Soil --> Structuration

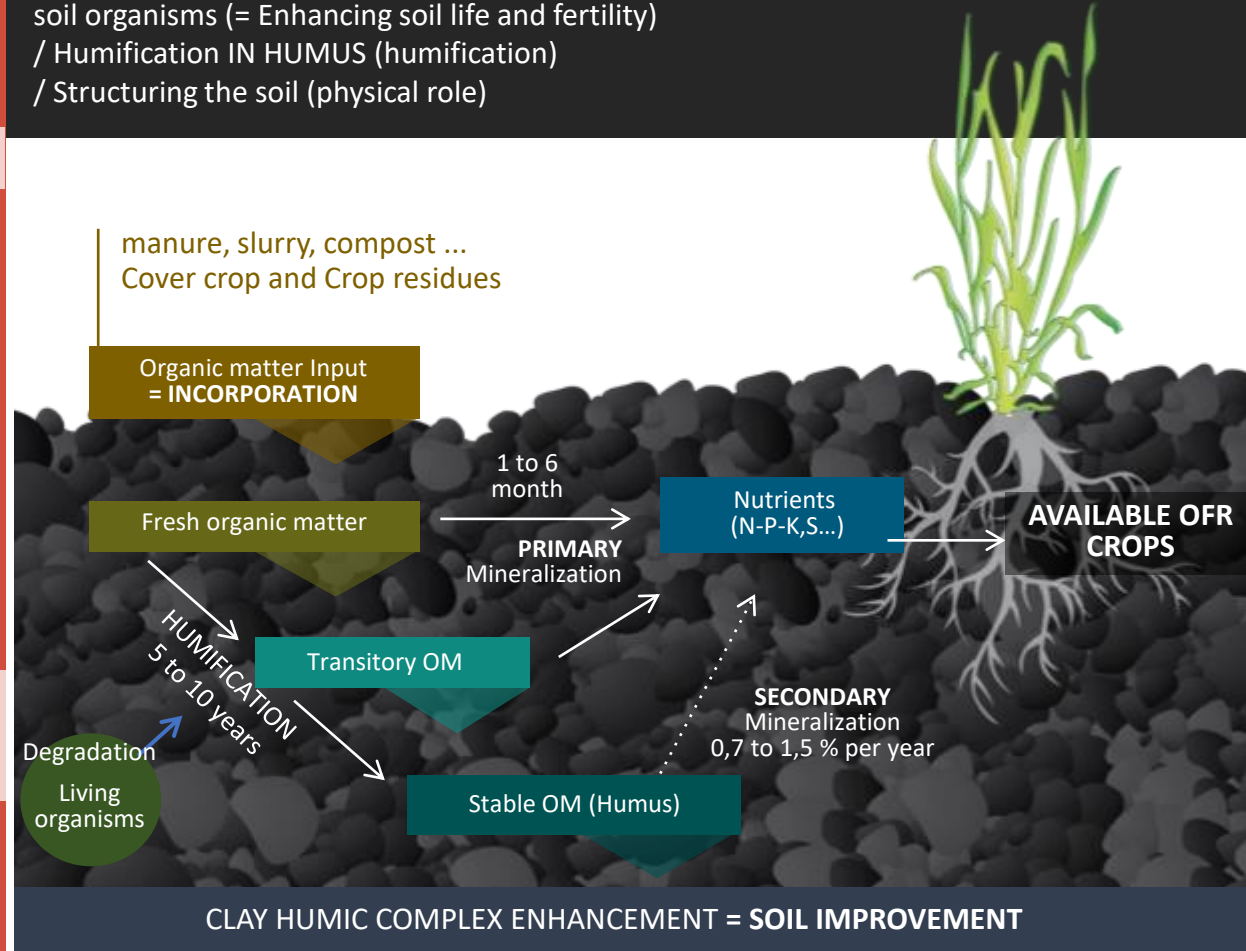
Microorganisms (including Amyllis bacteria) transform fresh organic matter :

- **ENERGY SOURCE** for their development
- **MINERAL ELEMENTS (MINERALIZATION)**

Mineralization of organic matter releases nutrients (N, P, K, S, ...) contained in organic molecules. Indeed, bacteria produce extracellular enzymes that can lyse certain chemical bonds.

The mineralized elements are thus available for the plants (= Nutrition) but also for the other soil organisms (= Enhancing soil life and fertility)

- / Humification IN HUMUS (humification)
- / Structuring the soil (physical role)



SOIL LIFE STIMULATION & CROPS NUTRITION.



AMYLIS

FUNCTION

3. ATMOSPHERIC NITROGEN FIXATION



AGRONOMIC ADVANTAGE
/ 20 to 25 Nitrogen units/ha

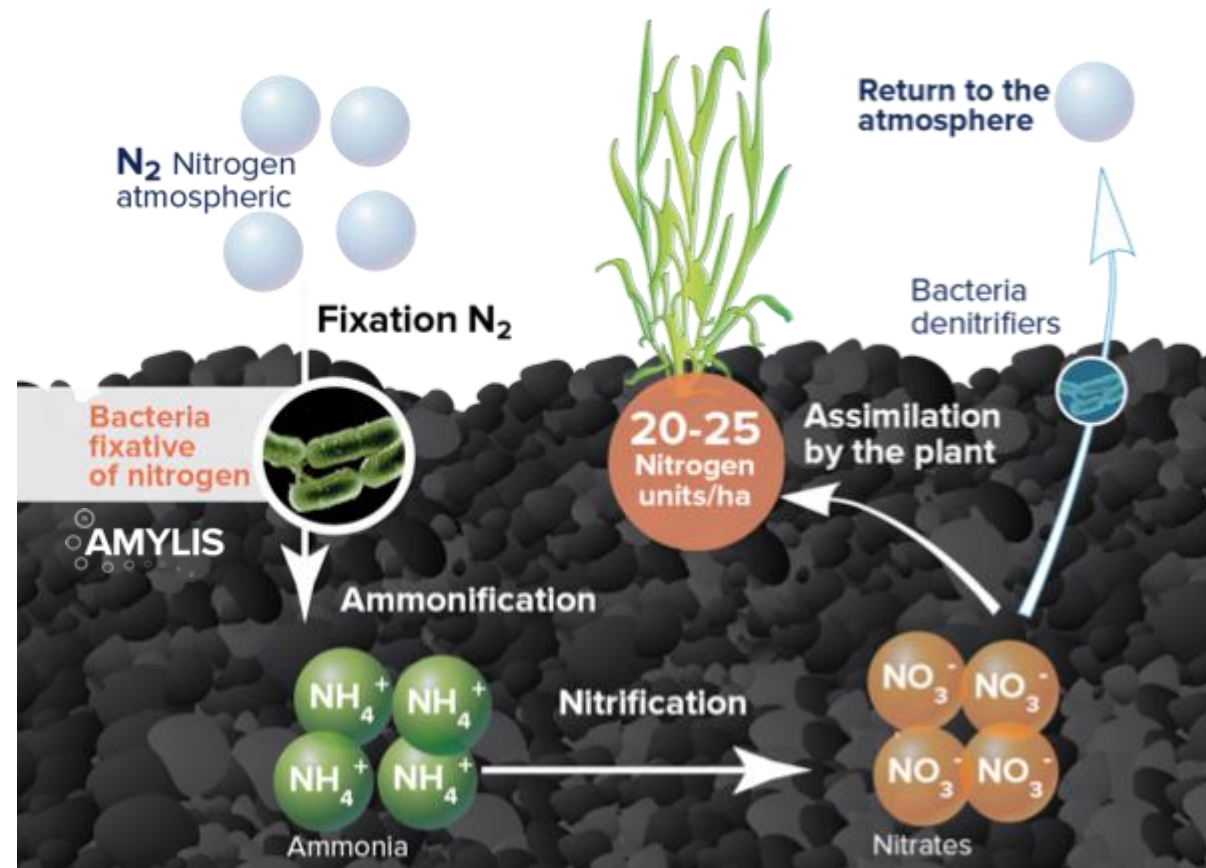
BioFertiliser
technologies

Simplified scheme of Nitrogen cycle
(Bacterial cycle)

AMYLIS BACTERIAS have the capacity to
FIX ATMOSPHERIC NITROGEN
& RETURN IT TO THE SOIL.

Nitrogen then will be assimilated by plants after nitrification
=> N release after winter.

EQUIVALENT TO
≈ 20 to 25 kg of N/ha.



SOIL LIFE STIMULATION
& CROPS NUTRITION.



AMYLIS

FUNCTION

4. NITRATES TRAPPING



AGRONOMIC INTERESTS

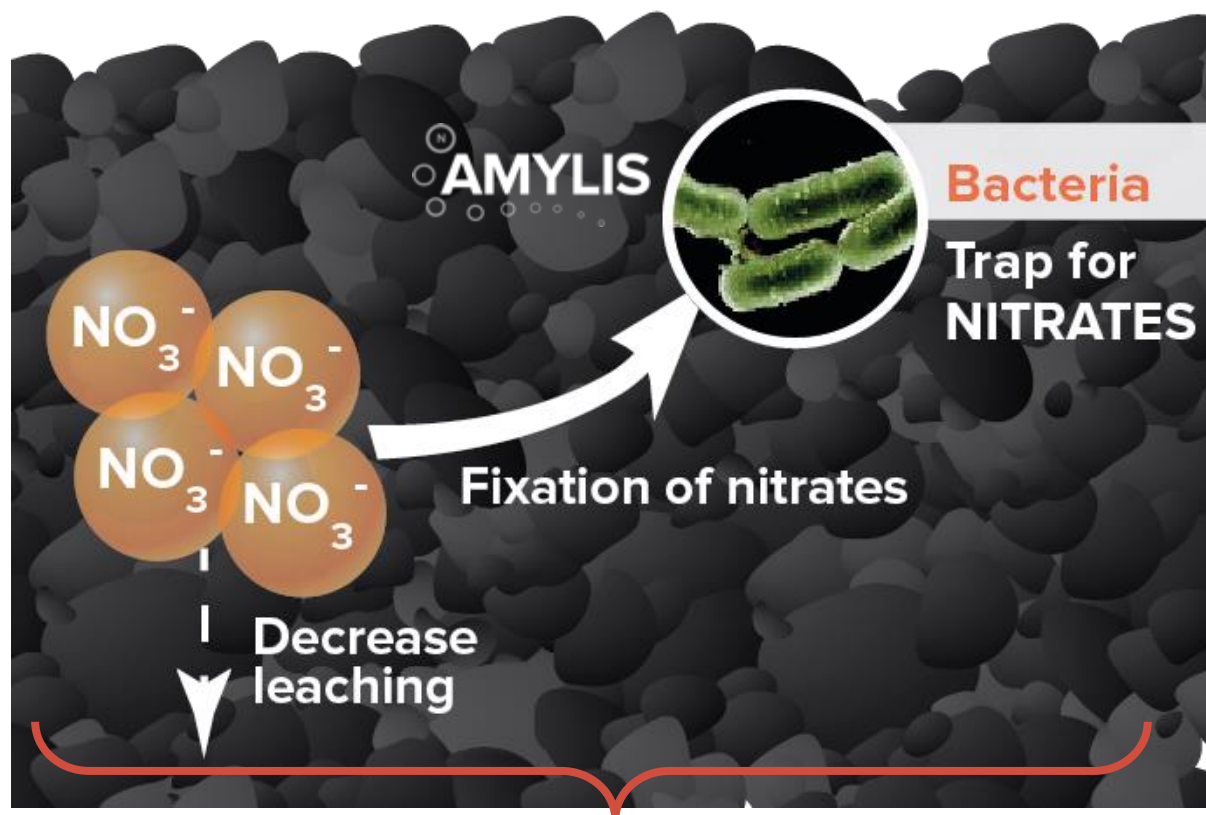
- / Reduce water pollution by nitrates
- / Increase Nitrogen efficiency (organic and mineral)

BioFertiliser
technologies

BACTERIAS FROM AMYLIS TRAP NITRATES BEFORE LEACHING DURING WINTER

assimilation phase during autumn = immobilization of nitrogen

Nitrogen will be then redistributed to crop when needed at end of winter. AMYLIS THEREFORE ALLOWS TO LIMIT THE POLLUTION OF THE WATERS OF THE NAPPES AND WATERSHEDS.



INCREASES EFFICIENCY OF
ORGANIC AND MINERAL NITROGEN CONTRIBUTIONS

SOIL LIFE STIMULATION & CROPS NUTRITION.



AMYLIS

FUNCTION

5. PGPR AND ROOTING EFFECT



AGRONOMIC ISSUES

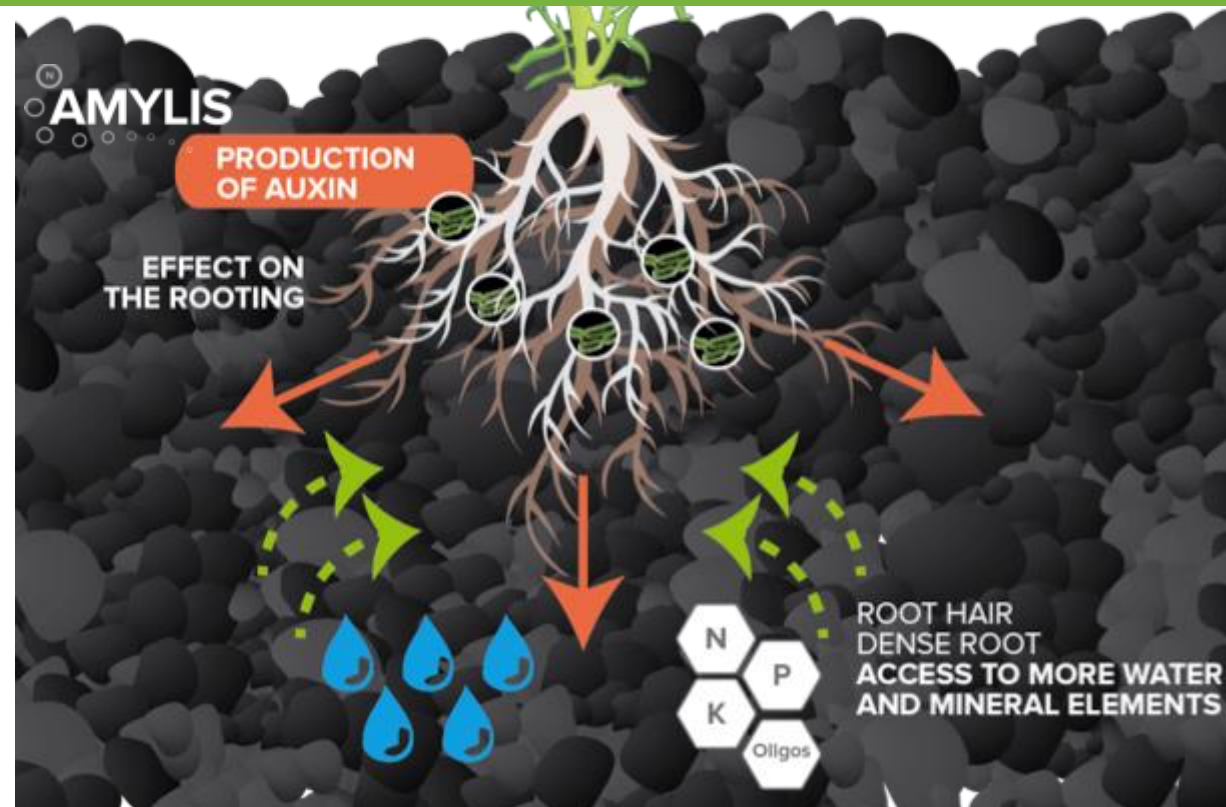
Helps to establish the culture

Bacterial strains of AMYLIS are capable of producing phytohormones and in particular AIA (Indol Acetic Acid) which is also called AUXIN .

The term auxin was then extended to a set of substances with similar physiological properties and related chemical conformation.

Auxin is a growth hormone with a strong RHIZOGEN POWER.
Which allows root elongation and the development of lateral roots.

Amylis thus **improves crop establishment** and optimizes the plants' natural ability to assimilate nutrients and water.



SOIL LIFE STIMULATION & CROPS NUTRITION.



AMYLLIS

FUNCTION

5. ROOTING EFFECT

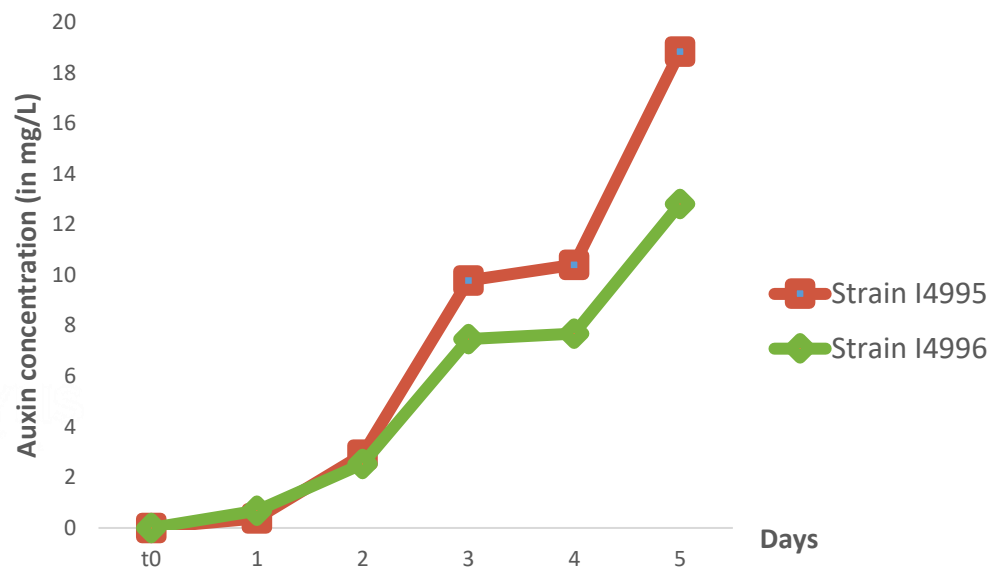


AGRONOMIC ISSUES

Helps to establish the culture

In vitro evidence of the production of AIA by the bacterial strains *Bacillus amyloliquefaciens* of the Amyllis product

Kinetics of Indol Acetic Acid Production



Souche bactérienne	14 996	14 995
[auxin] t0 in mg/L	0	0
[auxin] t1 in mg/L	0,68	0,37
[auxin] t2 in mg/L	2,53	2,9
[auxin] t3 in mg/L	7,46	9,78
[auxin] t4 in mg/L	7,68	10,4
[auxin] t5 in mg/L	12,81	18,84

SOIL LIFE STIMULATION & CROPS NUTRITION.



AMYLLIS

FUNCTION

6. ANTAGONISM FUNCTION



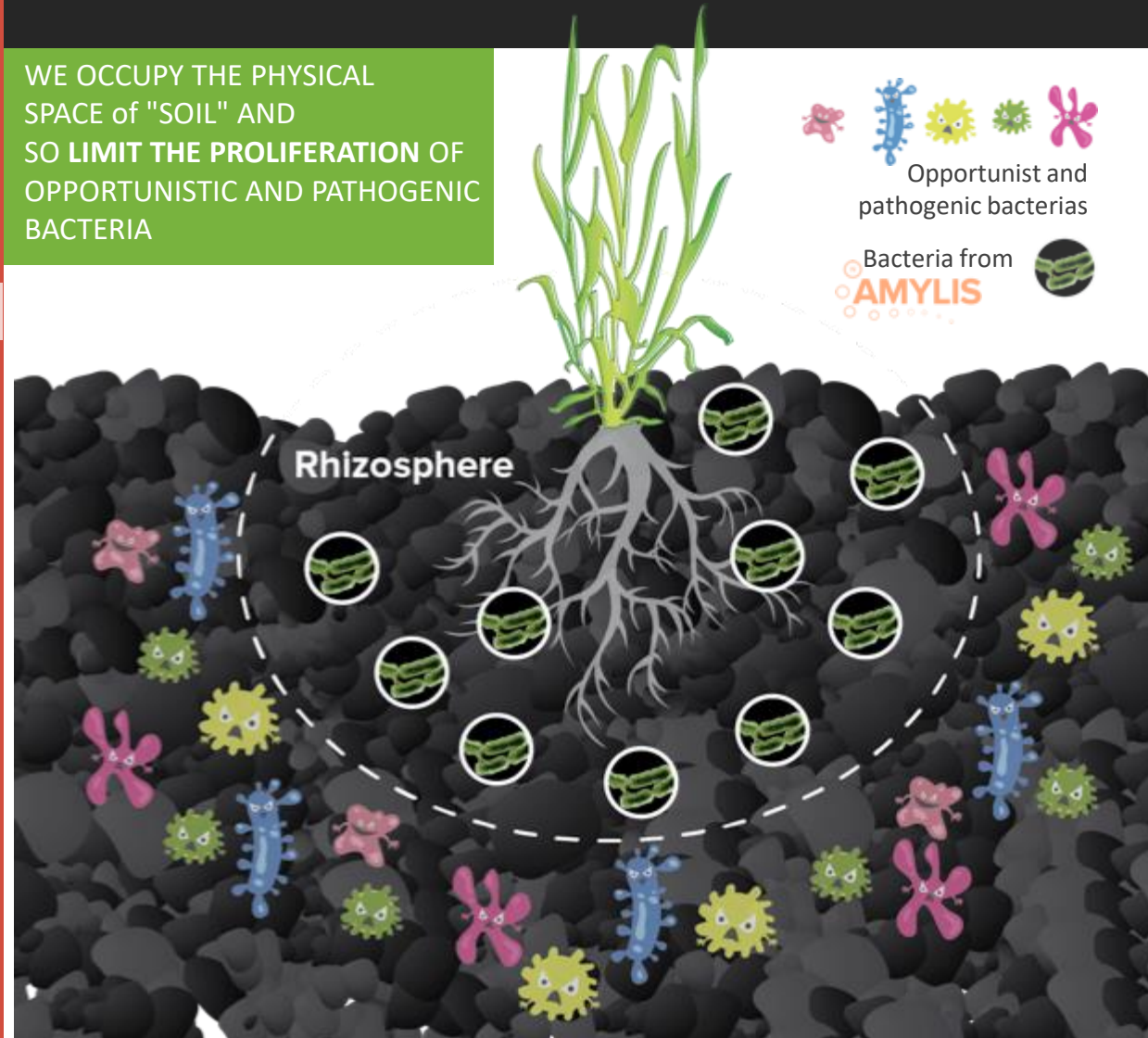
AGRONOMIC ISSUES

Bioamplification of beneficial bacteria against pathogenic or opportunistic flora

High concentration of bacteria in AMYLLIS (10^9 UFC/ml).

Thank to high population in soil, beneficial bacteria are great competitors against pathogenic bacterias and fungus.

WE OCCUPY THE PHYSICAL SPACE of "SOIL" AND SO LIMIT THE PROLIFERATION OF OPPORTUNISTIC AND PATHOGENIC BACTERIA





METHOD OF APPLICATION

DOSE : 0,5 L/ha - water volume 200L/ha

Soil application

/ full application

/ Via drip irrigation and spraying

MINERAL NITROGEN APPLICATIONS :

/ Compatible with Nitrogen liquid solution

ORGANIC NITROGEN APPLICATIONS :

/ Spraying on animal manures

/ Incorporation with liquid manure before broadcast (3 days max)

Fungicides – Insecticides :Check compatibility

Herbicides : 4 days before/after application.

Amylis can also be applied on implanted cover or just after sowing to promote implantation or recovery.



MADE IN FRANCE

SOIL ACTIVATOR



TRIALS RESULTS

BIO-SOLUTION

Agro**nut**rition

BioFertiliser
technologies

TESTING 2016

Soil

Culture :

Corn grain

Type of soil: Sand



OBJECTIVES : Yield improvement

Corn grain

Realised by :

Technical Service Distributor

Location :

40- Landes
(Audon)

Testing Type:

Block test (4)

Protocol

Sowing: 25/04/16

Density: 87,000 grains/ha

Harvest: 12/10/16

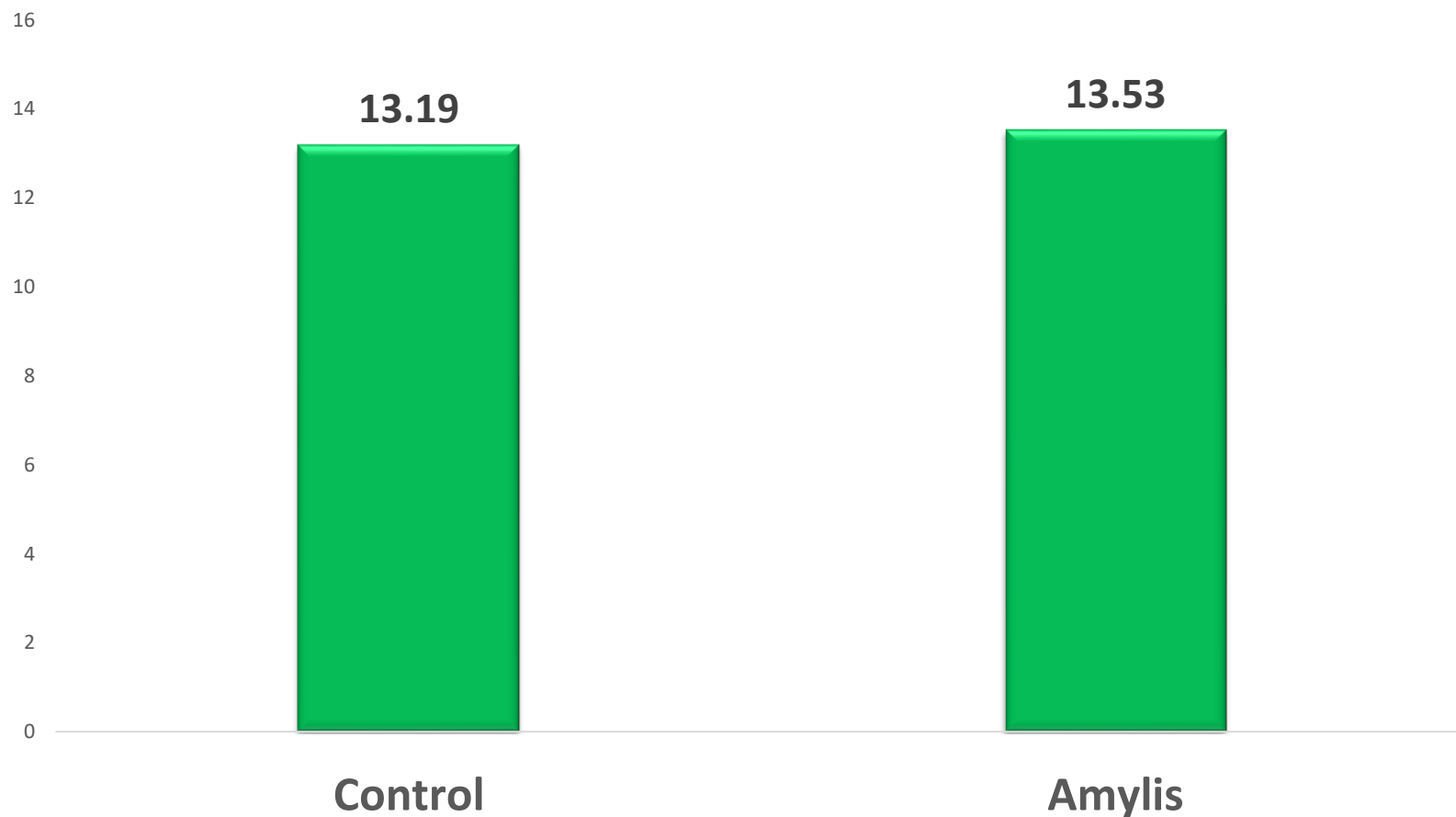
- Control X = 200 UN
- Amylis at 0.5 L/ha sprayed on crop residues (pre-plant burial)

Fertilization :

435 kg/ha of 46-0-0-0 on 7/06/16

BioFertiliser
technologies

Yield (T/ha)



The application of Amylis resulted in a yield improvement of 340 kg/ha. Flowering was one day earlier.

TESTING 2017

Soil

Culture :

Corn Forage Corn
Variety: Kroissans
Previous: Corn
Soil: Silt - No ploughing

Realised by :

Technical Service Distributor

Location :

56- Morbihan
(Kerfourn)

Testing Type:

Block test (3)

Protocol

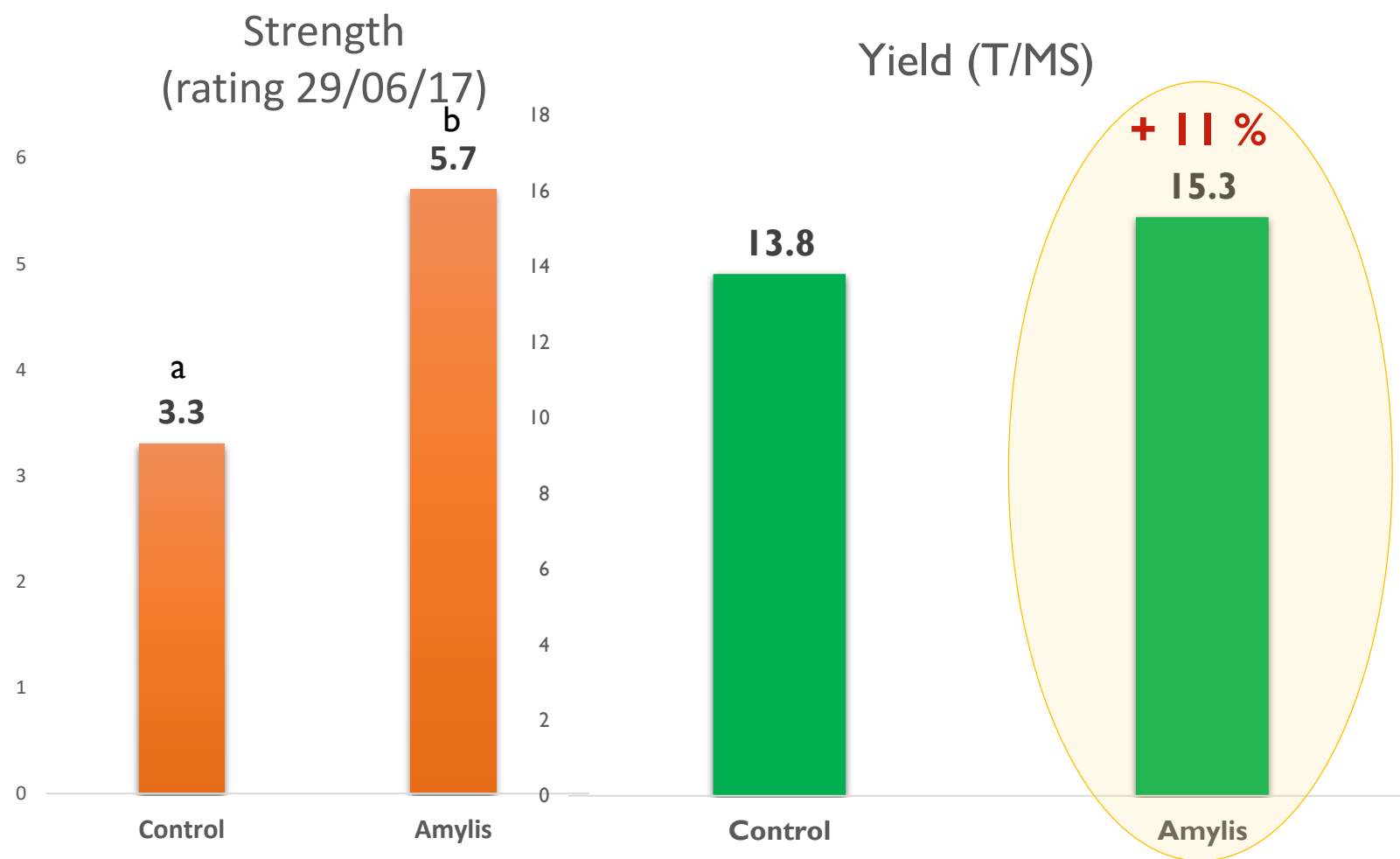
Sowing: 11/05/17
Density: 100,000

- Witnesses
- Amylis at 0.5 L/ha on Residues before sowing



OBJECTIVES : Yield improvement

Corn Forage



The application of Amylis resulted in a net gain in strength at the beginning of the crop with a statistically significant difference compared to the Control. This resulted in a yield gain of 1.5 TMS/ha or an 11% productivity gain.

TESTING 2017

Foliar

Culture :

BTH

Variety: Ascott

Previous: BDH

Soil: Clayey-silt sand

Realised by :

Technical Service Distributor

Location :

31- Haute Garonne
(Fenouillet)

Testing Type:

Block test (4)

Protocol

Sowing: 5/11/16

Remainders: 20 UN

- Control X = 189 UN
- 0.5 L Amylis in combination with the second contribution of Solaz

Fertilization :

36 UN on 3/01/17 (12-18-10)

77 UN on 30/01/17 (Entec 26)

40 UN on 16/03/17 (Solaz 30)

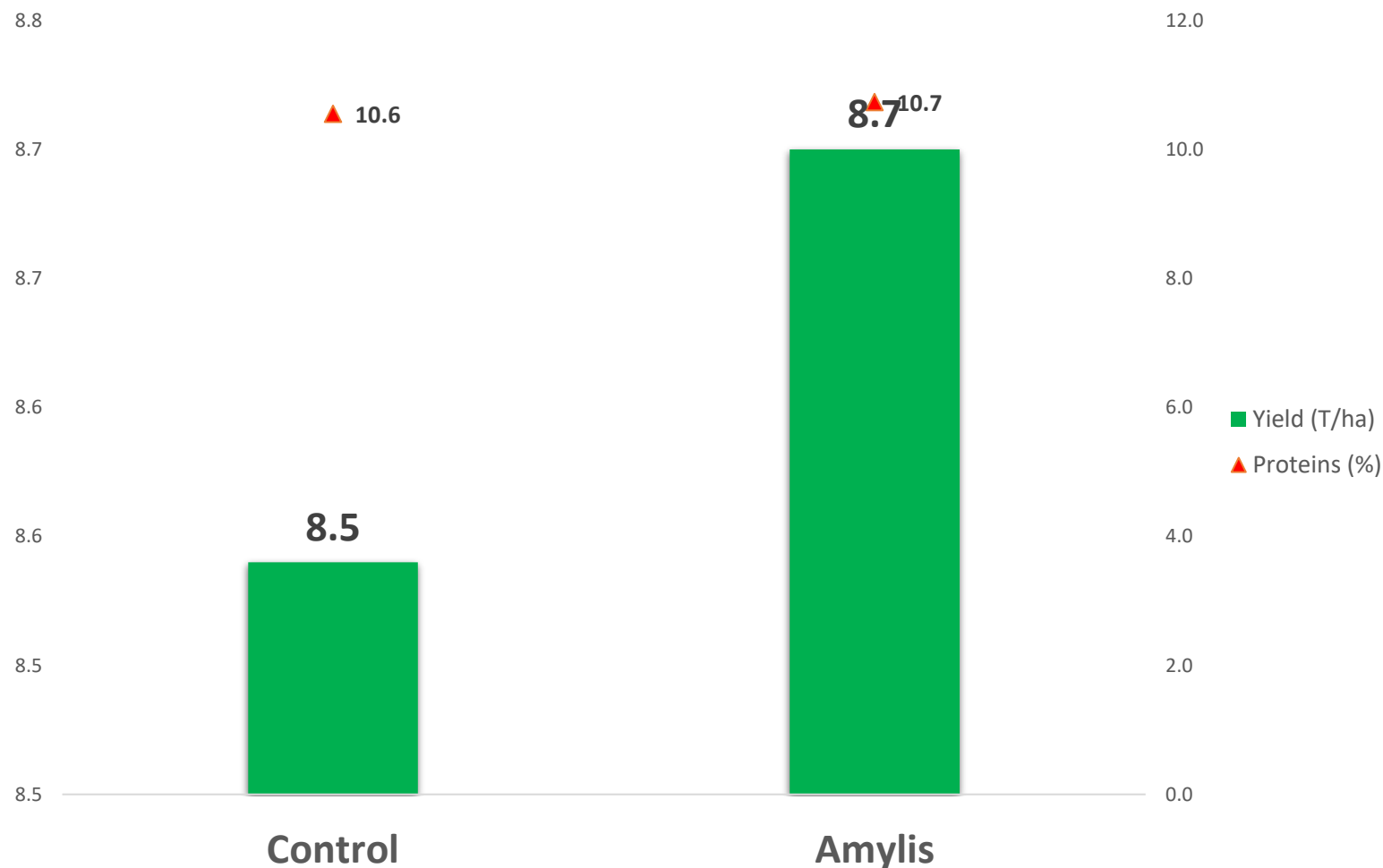
18 UN on 19/04/17 (Solaz 30)

18 UN on 4/05/17 (Solaz 30)



OBJECTIVES : Yield improvement

Soft Wheat



The application of Amylis in combination with the nitrogen solution resulted in a yield gain of 200 kg/ha with an additional 0.1 protein point.