

BIONUTRITION IN AGRAUXINE

How microbes could be a tomorrow's pillar of plant nutrition

B. Bonnet¹, V. Nicaise¹, H. Houdbine¹, C. Monnet², F. Le Broc², R. Kemperman², F. Achard¹, L. Villar¹, M.C. Réveillaud¹, A. Martin¹, R. Kempf¹ and C. Profizi¹

¹ Agrauxine by Lesaffre, 7 avenue du Grand Périgné, 49070 Beaucouzé, France

² Lesaffre Institute of Science & Technology Microorganisms Center of Excellence, 101 rue de Menin, 59700 Marcq-en-Barœul, France
l.villar@agrauxine.lesaffre.com

In the current agroecological transition, a main challenge is to preserve production levels and environmental health while using fewer conventional inputs of synthetic origin, and emphasize use of natural products based on or derived from microorganisms.

For 10 years Agrauxine has been developing a new range of biosolutions for optimizing crop nutrition by improving biological, chemical and physical interactions between plants and soils. These help in fertilizer use efficiency, a key element in the performance and sustainability of cropping systems.

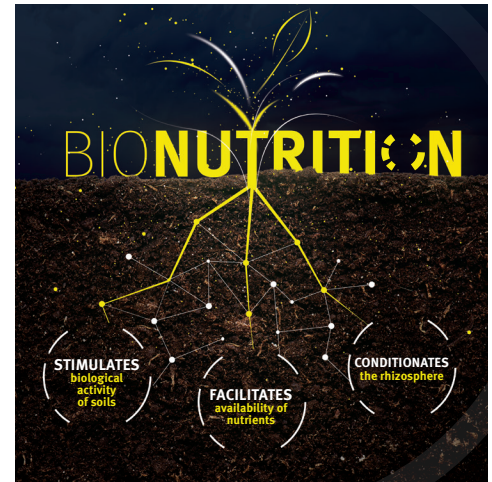
Agrauxine is selecting the best microbial based technologies, yeasts, yeast derivatives, bacteria and fungi, using its AgBiotech platform. This process combines diverse screening and characterization methods based on *in silico*, *in vitro* and *in planta* assessments.

Applied to soil or seed, or mixed with fertilizers, these new bionutrition technologies offer many new tools to growers.

Some examples:

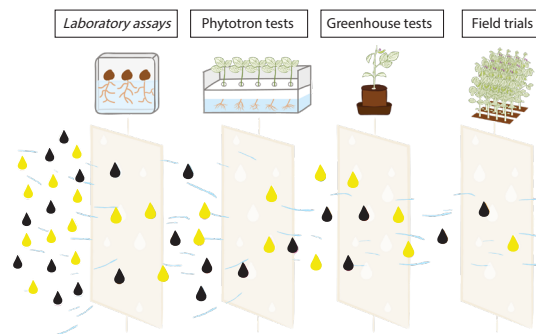
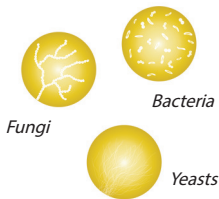
1. Stimulating the activity and diversity of microorganisms, naturally living or inoculated in the soil, which play a beneficial role in nutrient cycles,
2. Facilitating the availability of nutrients (e.g. nitrogen, phosphorus), improving the use-efficiency of fertilizers (through fixation, mineralization or solubilization), promoting their assimilation by the plant,
3. Conditioning the rhizosphere to provide the plant with the optimum environment for its growth and development.

Agrauxine's scientists and agronomists are bridging the gap between exploring and managing the plant-soil microbiome from the lab to the field. The potential for commercially available innovation that microbes offer as AgBiologicals is just at its beginning.



Agrauxine's AgBiotech platform

Microbe-based technologies



Final AgBiological candidates such as

4802 12051



SOURCE & IDENTIFY

microbial strains and their derivatives



TEST & SCREEN

for specific activities through multiple controlled environments



SELECT & VALIDATE

for improved performance in field



DOMESTICATE & STABILIZE

the formulation for shelflife, stability and compatibility

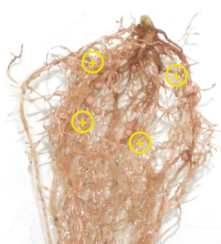
Soil microbiome

Aim: Develop an innovative AgBiological that stimulates the soil microbiome by promoting the beneficial microorganisms in the rhizosphere

Example: New microbe-based technology that boosts the root colonization by commercialized inoculants

Method: *In planta* biotest on different model plant species

- Targeted, low-throughput screening
- Visual or microscopic quantification and quality assessment of rhizobia nodules or arbuscular mycorrhizal fungi (AMF)



Bradyrhizobium japonicum



Mycorrhizae

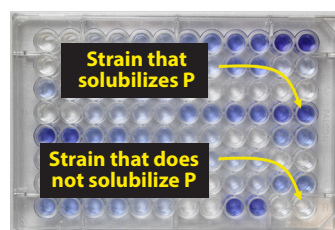
Soil nutrients

Aim: Develop an innovative AgBiological that increases the bioavailability of soil nutrients and their assimilation by plants, or that immobilizes organic carbon below ground

Example: Discovery of phosphorus-solubilizing microorganisms (PSM)

Method: *In vitro* assay

- Large, medium-throughput screening
- Colorimetric quantification of P solubilization in the liquid medium under artificial conditions



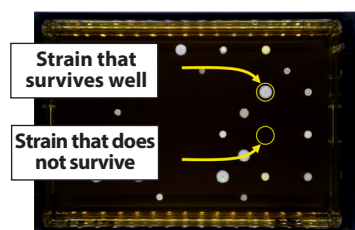
Soil structure

Aim: Develop an innovative AgBiological that improves the soil structure, aggregate stability and water retention capacity

Example: Fungal hyphae or bacterial biofilm play an important role in holding soil particles together, but it is first essential to verify the survival and colonization capacity of these strains alone in the soil

Method: *In vitro* microplate assay

- Large, high-throughput screening
- Microbial growth on soil extract media at different temperatures and pH



Promoting the best microorganisms from the lab to the field