How to create a single market for microbial growth promoters, needed by farmers, stimulating innovation but avoiding risks

Claude Alabouvette

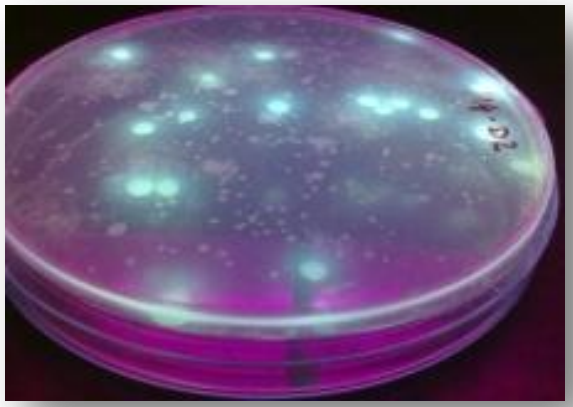
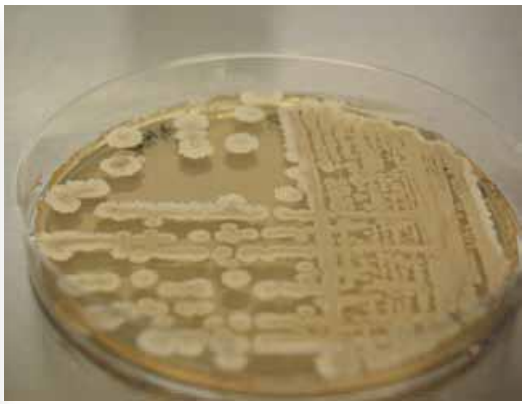
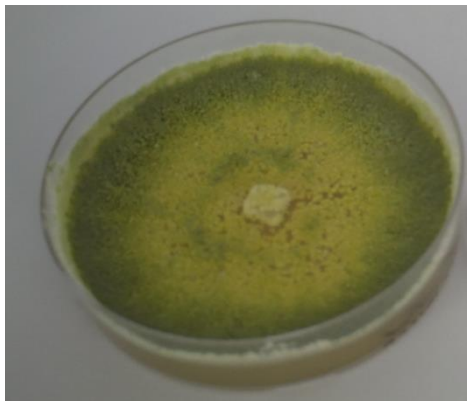
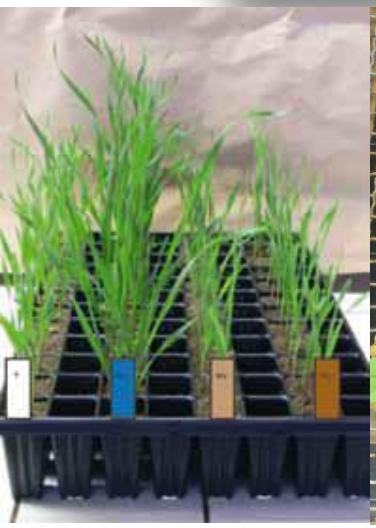
Microorganisms promoting plant growth

- Among the different categories of plant growth substances microorganisms (bacteria and fungi) are among the most promising
- They can promote growth, increase yield, help the plant to resist abiotic stresses …
- They are either symbiotic such as mycorrhizae and rhizobiacae or free living microorganisms in the rhizosphere of the plant

Microorganisms promoting plant growth

- **Their modes of action are diverse:**
  - **Assimilation of nitrogen (*Rhizobium*, but also *Azospirillum, Azotobacter, Klebsiella, Burkholderia…*)**
  - **Solubilisation of elements such as phosphorus (mycorrhizae but also *Bacillus, Pseudomonas, Burkholderia* …)**
  - **Production of hormone like substances having an effect of root growth and ramification…(AIA, cytokinines, gibberelines)**
  - **Production of siderophores (iron availability)**

Examples of beneficial microorganisms and their effects

Creation of a single European market

- Farmers want to use biostimulants, which can help to reduce the use of mineral fertilizers and improve both soil and plant health.
- Today, the absence of an EU regulation, limits the use of plant growth promoters.
- The proposed regulation intends to create a single market, but there is still no consensus regarding microorganisms which pose specific problems

Microorganisms pose specific problems

- In contrast with natural substances, they are living organisms able to multiply, producing many secondary metabolites and able to exchange genetic information to other living organisms. Thus they are considered to be more difficult to manage than chemical substances
- They are not only growth stimulators but also plant protection products and as such regulated by regulation 1107/2009, but this regulation is not adapted to microorganisms
- Their properties are strain specific

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- Strains belonging to a same species share common traits but, pathogenicity, toxicity as efficacy are mainly strain specific
- It exists both beneficial and pathogenic or infectious strains in a same species
- Question: will it be possible to establish a positive list, at which taxonomic level?

Examples of genus including both beneficial and hazardous species and strains

- *Pseudomonas*
- *Burkholderia*
- *Pantoea*
- *Stenotrophomonas*
- *Trichoderma*

Identification at the strain level should be required

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- The classical concept of species does not apply to bacteria
- A bacterial strain must be identified at the molecular level, and new « species » are regularly proposed
- The well known *Bacillus subtilis* species has been subdivided in several species and now the group *B. subtilis / amyloliquefasciens* is considered
- Even in fungi, « old species » are now subdivided in several new species :strains belonging to *Trichoderma harzianum* or viride are now in the species *atroviridae, viridae, gamsii*…

Safety assessment

- Regarding microorganisms used as feed or food additives, EFSA's Scientific Committee recommended in 2007 to adopt a Qualified Presumption of Safety (QPS) approach.
- However, in some cases, microorganisms belonging to the QPS list are not allowed in agriculture without full assessment (*Bacillus amyloliquefasciens*)
- Question: which criteria should be considered to decide that a microbial biostimulant can benefit from the QPS status?

Efficacy assessment

- Having established identity of the strain and assessed the risks, efficacy should be demonstrated
- On which criteria?

  Potential efficacy based on published data

  Efficacy assessed under controlled conditions or in the fields?

How to promote innovation

- Products coming today to the market have been selected by public research institutions, which have characterized the strains and studied their biology, modes of actions, etc..
- The industry has set up the production and formulation processes and taken the cost of the registration dossiers
- An open market should drive innovation, new strains, new formulations should be proposed to farmers

How to promote and protect innovation

- The microbial world is largely ignored.
- Bacteria are producing many secondary metabolites, but we know that a single strain has the capacity to produce hundreds of secondary metabolites and we can expect real progress based on genomic research.
- But will industry invest in research if the results will be made available to everybody through a positive list?

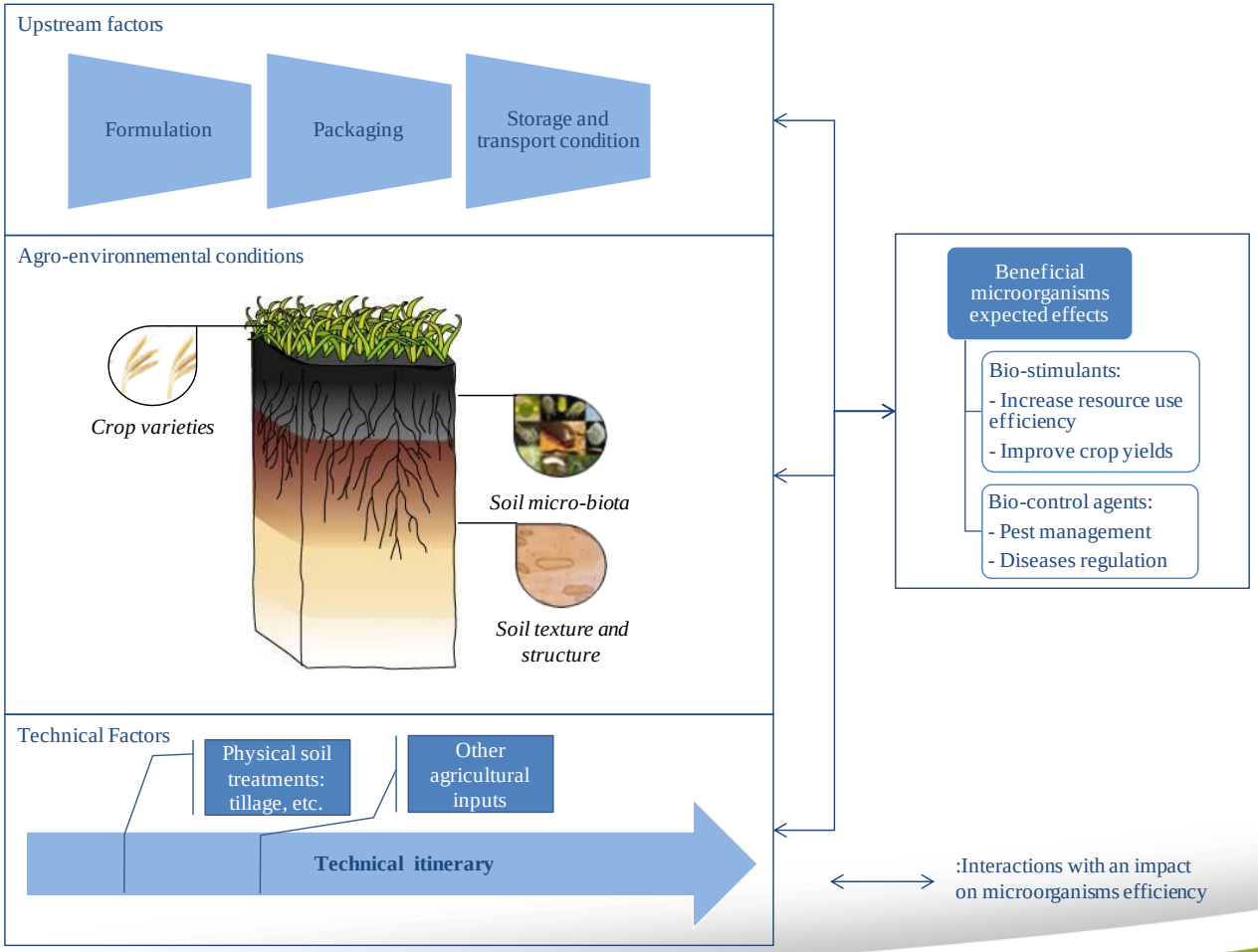
Harmonization at the EU level is needed

- If the positive list is limited, as proposed today, to 4 groups of microbial bio-stimulants, there will be no unique market for microorganisms
- A unique market requires harmonization of requirements otherwise different national regulations will apply and mutual recognition procedure will be needed to sell a product all over Europe.

How to promote the use of Biostimulants

- Farmers willing to use biostimulant complain on the lack of efficacy, lack of consistency in the beneficial effects
- Indeed, in contrast to fertilizers, biostimulant efficacy is dependent on many parameters: the soil (soil type, pH organic matter content..) on the crop, even of the crop cultivar, on the climatic conditions, on other cultural practices

Factors influencing microorganisms' effectiveness under field conditions



How to promote the use of Biostimulants

- To make progress:

  much more experiments and field demonstrations must be done all over Europe,

  extension services, farmer's organization must cooperate to define the best agronomic practices needed for successful application of biostimulants

  Industry must improve formulation to adapt to farmer's use and machinery

How to promote the use of Biostimulants

In the frame of programme H2020, we applied to the recent call « Rural Renaissance » (RUR 10 – 2016) and proposed the creation of a

"Multi-actor network for a more sustainable agriculture based on beneficial microorganisms use"

- AGRIBO –

A single market is needed for both the end users and the producers of microbial biostimulants

- To achieve such a unique market
  - Identification at the strain level is needed to avoid risks
  - Requirements for registration must be harmonized
  - Producers and regulators must agree on the needed requirements
  - Producers and regulators must also agree on the control procedure

AGRENE

Thank you for your attention

Ready for questions/discussion