



ENCONTROS  
SCIENTIA

# BioClub - Designing biofertilizers by mimicking plants' recruitment of rhizospheric partners

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- Increasing crop productivity while ensuring food security and decreasing the environmental impacts of agriculture is a major challenge for the coming decades.
- In the XX century, increased productivity was mainly achieved through improvement of crop varieties and increased use of inorganic fertilizers and pesticides. Although successful, the long-term sustainability of the strategy is debatable mainly due to its environmental impacts.
- The question we face is: how can the Earth provide food security for the growing human population, and continue to be a safe place for humanity? The BioClub team believes that the next steps towards a sustainable agriculture require understanding the networks, which regulate the distinct components of the agrosystem. No organism is an island; all the phenotypes observed are the product of the interplay of millions of organisms that express their genotypes in very dependent and regulated ways. Agrosystem management has to take into consideration that the symbiotic lifestyle is the norm. Therefore we have to provide crops with nutrients, but also with agents able to regulate the fate of those nutrients. The most obvious regulator agents are rhizospheric microorganisms, some of which are well known plant growth promoters (PGPM– improve nutrient use efficiency – NUE, plant defence, productivity, food quality), and are already used as biofertilizers.
- BioClub advocates that biofertilizer efficiency (in NUE, plant defence, productivity, food quality) may be much improved if, in addition to microbial agents (fungi and bacteria), the factors that strengthen the symbiotic relations between the partners are also considered in biofertilizer formulation. BioClub will take advantage of well known and characterized PGPMs (*Glomus intraradices* or *Piriformospora indica*, and *Azospirillum brasilense*) and will focus on the interplay between the microbial agents (fungi and bacteria) and the plant: plant exudome (wheat varieties), biofilm production (natural stimulation and stimulation by autoinducer-like substances), and lifestyle3 (associative versus endophytic), in order to produce an efficient and affordable biofertilizer prototype BioClub (Task1).
- We expect that the proof of concept (pot and field trials) will show that a stronger symbiotic relationship between the plant and the biofertilizer (higher biofilm formation in presence of the endophytic *A brasilense*) will: 1) at the scientific level be more beneficial to the plant; and 2) at the technical level allow the formulation of a biofertilizer compatible with European guidelines for reducing the recommended dose of mineral fertilization by 30% (Tasks 2 and 4); improve plant tolerance to moderate pathogen attack (Task 3); present consistent benefits across distinct abiotic conditions (temperature and water availability, Task 2).

**Thursday, November 10th, 2016**

**FCUL (Building C2), 12h00-13h00,  
room 2.2.14**