

Report on the Swiss-Colombian workshop 2024: “Metagenomics data analysis of mixed microbial communities.”

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Introduction

This workshop was organised as part of the Swiss-Colombian project “Improvement of rice straw management in Latin America using metagenomics and synthetic communities (SynComs) to reduce CO₂ impact”. The project was financed by the Leading House for Latin America and managed by the University of St-Gallen, Switzerland. It aims at expanding preliminary work done to sample metagenomics sequences from various treatments applied to rice straw to speed up composting. To broaden the range of participants, the workshop topic was chosen to cover the world of mixed microbial communities.

The workshop announcement was carried out via several mailing lists in Colombia, via a [web page](#)¹, and on social networks. We gathered over 35 registrations and selected 27 participants, balancing their interest in the topic, academic level, and home university. They were distributed among students, researchers, and group leaders from various universities in Colombia: Ibagué, Bogotá, Cali, and Medellín. The gender balance was 30% male and 70% female.

Programme

The workshop was held from June 17th to June 21st, originally planned at the Biotechnology Institute of Universidad Nacional de Colombia (IBUN-UNAL). However, we had to move to a nearby hotel conference room due to a student's strike blocking the accesses to the University.

Participants were asked to have some prerequisite skills like UNIX and R basic knowledge. To ensure that all participants had a similar level from the beginning, the first day of the workshop was used to refresh the

participants' programming-scripting competencies. The slides of the courses and the practical exercises were accessible through a Moodle page hosted by the University of Fribourg. Each half-day was split into theoretical lectures (60-90 minutes each), followed by hands-on practical sessions (150 minutes each). The detailed program is shown in Figure 1. For the practical sessions, we either used RStudio on the participants' laptops or a remote HPC cluster located at the University of Bern, Switzerland. Participants were allowed to connect remotely using dedicated access, and for the whole genome shotgun analysis, the participants worked in groups of four. To ensure the participants' motivation, we asked them to answer exercises at the end of each practical session. In addition, we asked them to prepare a presentation in groups for the final day.

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On the final day, a mini-symposium was organised.

We invited **Prof. Pilar Junier** as keynote speaker from the University of Neuchâtel, Switzerland. She gave a brilliant lecture on “Fungal highway columns and interactions between soil fungi and bacteria”, demonstrating the use of various 3D printed materials to study how the bacteria can travel using fungal hyphae as a road. Remotely via Zoom, we had the opportunity to listen to **Dr Vanessa Otero's** excellent lecture from the University of Idaho, USA. During her talk, Vanessa explained how “Rice Straw recycling increases soil microbial functional diversity during rice straw decomposition”. **Dr Ivan Mateus** from the University of Fribourg, Switzerland, gave a fascinating lecture on “Non-canonical analyses of controlled small communities”, where he demonstrated how one could study mycorrhizal and nodular symbiosis using bioinformatics analysis of Next Generation Sequence (NGS) data. We ended the mini-symposium with two lectures from MSc candidates, both from Universidad

¹<http://bioinf.ibun.unal.edu.co/cursos/Metagenomics2024/>

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Workshop Program



Figure 1. Detailed programme of the Swiss-Colombian workshop

Nacional, **Nicolas Rodriguez-Romero**, “*Microbiome-based targeted bioprospecting to produce a nitrogen-fixing biofertilizer using waste-derived carbon sources*”, who reported on the use of pig manure to produce

fixed nitrogen and short-chain fatty acids (SCFA) with bacterial communities, and **Nicolás Novoa**, “*Selection and perspectives on microbial consortium development: a case of study on rice straw degradation*” concluding with



Figure 2. Classroom of the workshop



Figure 3. Group picture in front of the hotel

a demonstration of pairwise compatibility assessments of *Trichoderma* and *Bacillus* strains.

At the end of the workshop, the seven groups of participants presented the results obtained during the practical sessions.

Evaluation of the course

The participants were given an online evaluation form to evaluate the workshop. The form included an overall evaluation of content, objectives, methodology, and logistics. The participants from the different research institutions expressed their satisfaction with the high academic level of the course in general. They highly valued the knowledge shown by the trainers and the materials used in the lectures and practical exercises.

Some participants regretted the lack of time to finish the practical exercises and sometimes too few monitors to help them. They recommended improving this part in the future. The Wi-Fi connection issues on the first day were also mentioned as preventing a good understanding of the topic. Fortunately, the hotel staff solved these issues at the end of the day, and the rest of the week was perfect.

Other aspects, like motorbike noise and the “mooring cow” food truck in front of the hotel, partially disturbed the class. Luckily, these were counterbalanced by the delicious hotel coffee breaks and the social dinner organised by the teachers!

Before concluding, a little anecdote: the use of online presentations seems normal nowadays in 2024, but it wasn't in 2005 when we first experimented with it between Colombia and Switzerland for an EMBnet

course with the now defunct Marratech system (see course report page 5²). It's this pioneering role that we like to play at EMBnet (Prof. Barreto is the EMBnet Node Manager for Colombia and Dr. Laurent Falquet is a former EMBnet Node Manager for Switzerland).

Conclusions

According to the comments of the attendees and the reported good feeling of the organisers, this workshop was very successful and led to potential collaborations. We will continue working on mixed microbial communities, looking to improve the knowledge on the interactions between fungi and bacteria. In particular, the management of rice straw using synthetic communities will remain our main interest in the future.

Acknowledgements

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²<https://journal.embnet.org/index.php/embnetnews/article/download/94/110>