

Summary Report

WDCM training Course for microbiome data Sharing

Personal introduction

My name is Paz Millas Ortiz, I work in National Research Institute of Agriculture (INIA) in Chile and for the Chilean Collection of Microbial Genetic Resources (CChRGM), I am plant pathologist and I am in charge of molecular identification laboratory. My main research line is biological control of plant diseases. Currently I work in molecular identification of Chilean collection of *Trichoderma* spp. Also in isolation, mechanisms and molecular identification of antagonistic microorganisms from suppressive compost and soil and a microorganism screening to determinate endophytes with antagonistic capacity against *Pseudomonas syringae* pv. *syringae*.

CHILEAN COLLECTION OF MICROBIAL GENETIC RESOURCES (CChRGM)

ABSTRACT

I am Paz Millas I work to CChRGM belonged to National Research Institute of Agriculture (INIA) in Chile. It is the first International

Authority of Deposit (IDA) in Latin America. Most microorganisms of the collection are agents of biological control of plant pest and diseases, but it is open to receive strains from industry and pharmaceutical uses. Several benefits can be described from this course, among which stand out: 1) Information about in different issues related to Culture Collection (CC) and microbial research such as: contact information of other culture collections, Chinese Academy of Science (CAS), scholarships or collaborations, research developed in CAS and core facilities, databases and platforms, software and programs to data analysis. 2) Review of several techniques and interesting topics. 3) Visit to laboratory BSL-3 and CGMCC. Some suggestions to WDCM work are: to encourage CC to join to GCM and ABC data mining, continue with the organization of international meeting and training course in issues related to microorganism. Foster cooperation with different international organizations and the CC belonging to WDCM. Finally, there are several work that could be work in collaboration like studies of microbiome associated to native plants, however the possibilities of collaboration of these studies depends in part of applying to projects and funding of our country. For this reason is very useful for our CC have the contact with CAS to future collaborations.

Key words: Culture collection, WDCM, CAS, Microbiome, Database, Microorganisms.

1. Brief introduction of your Culture Collection.

The Chilean Culture Collection of Microbial Genetic Resources (CChRGM) is located in Chillán city under INIA (National Institute of Agricultural Research) administration, the culture collection is part of INIA's Genetic Resources Program.

The first collect was initiated in 1990 with the objective to obtain native microorganisms along the country and to be used as biocontrol agents against pests and diseases. The biological diversity of Chile has allowed the collection of microorganisms in places with extreme weather and soil salinity conditions or presenting one of the higher degrees of endemism such as: desert areas, cold forests with permanent rains, land to altitudes above 5,000 m, hot springs, glaciers, salted lakes etc. Although the emphasis of the collection has been its use in biological control, after the bank obtains the International Deposit Authority status (IDA) in 2013, the collection has opened to receiving strains from industry and pharmaceuticals. Today, the CChRGM is still the only IDA in South America, and receive long term deposits of microorganisms used in agriculture, forestry, environmental and industrial process.

To assure the viability and inalterability of microorganisms in the long time, the CChRGM has the infrastructure, equipment and professionals specialized in the management and preservation of microorganisms. Thus, preservation is performed by two methods: cryopreservation and

freeze-drying.

Moreover, the IDA status permits the international recognition as Deposit of Microorganisms for the Purposes of Patent. Currently the bank is qualified to receive deposits of bacteria and fungi from all over the world. Currently the collection has more than two thousand microorganisms between bacteria and fungi. Including microorganisms that are epiphyte, endophyte and rhizospheric. Most of microorganisms are entomopathogen and phytopatogens fungi.

Our work includes collection, molecular identification and characterization of microorganisms. Moreover, the CChRGM provide services of molecular identification, quality of bioproducts and phytopathological analysis.

2. Benefit from the training courses.

Several benefits can be described:

Information and contact with other culture collections (CC):

Interaction with curators of CC from different countries and the presentations with the main information of the different CC permitted to know the size, the origin country and the main focus of each CC, this information is very useful for future collaborations.

Information of Chinese Academy of Science (CAS): Is interesting to know the different research areas and organization of CAS that are related

with microorganisms and CC. To know that CAS has areas such as: Microbial resources, Microbial biotechnology, Pathogenic microbiology & immunology with their respective laboratories are important to know in that areas are possible apply for postdoctoral studies or to work in collaboration.

Information about scholarships or collaborations: Is interesting to know the possibilities of scholarships for postdoctoral fellows, Ph. D. studies and to conduct studies or projects in collaboration with CAS. Moreover is very value to know the web page and the person to make the contact to this type of relationship with CAS.

Information about level of research and facilities of CAS: Is very interesting to know level and topic of research that is doing the CAS. Was especially interesting for me the study presented by Dr. Jun Wang, both for the high level of his studies and for the subject he develops.

Although his research is focused in the microbiome of the human intestine, I think that the research methodology used is extrapolable to studies of suppressive soil microbiome and communities. The study of suppressive soil communities has particular importance to understand the basis of general suppression of plant disease and biological control of phytopathogens.

Information about databases and platforms: During the course we reviewed a wide gamma of databases and platform very useful for work

and research in microorganisms such as: 16S rDNA databases (Ez Taxon-e, Ribosomal Data Project, SILVA, Greengenes), Analyzer of biosource citation (ABC), Fungal database (Q-bank, Mycobank, NBCI, etc), Fungal omics database, Microbiome databases (COLD, MgOl, IMC, EBI Metagenomics), Genome analysis platforms, Microbiome data cloud platform, International barcode of life project (iBol), Platform to bioinformatics and metagenomics, Global catalog of microorganisms (GCM) and Global mirror System of DNA Barcode data. Some of them are known for me and normally used, but others were known during the course.

Information about several software and programs to data analysis: It was very valuable to know others software different at that normally use for Phylogenetic programs (PhyLIP, PhyML, Mr Bayes, ITOL, MAFFT or Treeview), for analysis of microbiome (SOAP, SPAdes, OPERA, CRT) for Average Nucleotide Identity Calculation (Jspeciesws, OAT, AutoAMI) and assembly tools (TIGER, MaLTA, IMAGE 2.4.1., OMEGA 1.0.2., AMOS 3.1.0)

Review of several techniques: Was interesting to know the work of CAS in different techniques although are no directly related with the work that CChRGM makes until now is related to the research with microorganisms and can be included in future works. These techniques are transformation of microorganisms to synthesis of secondary metabolites and label-free

biomolecular interaction technology. This lecturer was very interesting and novel to me.

Review of interesting topics: Was interesting to know more about different topics related to CC and microorganism researches such as: ISO standards and accreditations to material and laboratory processes, ISO/TC 276 Biotechnology, Microbiome Initiative and different projects that are involved, Biosafety and Biosecurity management in laboratories and CC, CAS Core facilities.

Visit to laboratory and CGMCC: Was very interesting can visit laboratory with Biosafety level 3 (BSL-3) and the China General Microbial Culture Collection (CGMCC) mainly because of the large number of samples it preserves.

Organization and hospitality: Thank the organization for all the efforts deployed by the coordination with the professors for the lectures, for the accommodation in the hotel and for the food that for me is a world of new experiences.

3. Suggestion on WDCM work.

I think that the WDCM have done a big work developing several data base platforms, helping for international information network, organizing training course between others activities.

Some suggestions are:

To encourage CC to join to GCM.

To request WDCM country report.

To encourage CC to join to microbiome database like ABC datamining.

Continue with the organization of international meeting of CC and microbiome area.

Continue with the organization for training course in issues related to microorganism CC, such as: biotechnology methods, next generation sequencing, metadata analysis, quality standard and ISO standards accreditations.

Continue to foster cooperation with different international organizations and the CC belonging to WDCM.

4. Comments or suggestion on the training courses.

The training course was very useful for me as researcher and for the CChRGM that I represent. Mainly because the information about the WDCM network and possibilities to cooperation work with CAS and other institution belonged to WDCM. Moreover was an interesting review of different database related to microorganism researches and CC.

As a suggestion it would be good that data practices are guided to specific exercises to perform within each of the reviewed platforms, similar to the performed by Dr. Jun Wang in 16S metagenomics analysis in which was included a tutorial.

5. Suggestion on further cooperation between WDCM and your collections.

Future work plans of our CC include the study of plant microbiome with emphasis in wild endemic relatives of cultivated plants. Wild relatives have been growing in natural environments for thousands of years and probably maintain a much higher microbial genetic diversity than cultivated relatives.

We think that wild plants have important traits, such as biotic and abiotic stress resistance/tolerance. Chile is the center of origin of strawberry (*Fragaria chiloensis*), landraces of common bean (*Phaseolus vulgaris*), wild tomato (*Solanum* sp.), and the sub-center of potato (*Solanum tuberosum* sbsp. *tuberosum*). Also is possible to find wild relatives of barley (*Hordeum* sp.). Therefore, microbiome of these plants is source of genetic biodiversity unique in the world and deserves to be studied. Molecular characterization of microorganisms associated to native berries is another point of interest, however the possibilities of collaboration for both studies depends in part of applying and funding of our country.

Another issue of interest is the study of suppressive soil microbiome and the relationships with substrate utilization patterns by microbial communities, it will be interest make collaboration to CAS for this study, but also it will depend of possibilities of financing of Chile. Anyway is

very useful for our CC have contact of Dr. Liang Yong to future collaborations.

I want said thank for all.