

**ANNEX III****APPLICATION FORM INCLUDING THE TRAINING COURSE PROPOSAL*****Section 1: Background on the training proposal*****Project title**

DNA Barcode training course and grasses barcode pilot project

**Preamble**

Uruguayan grasslands are highly diverse regarding native vascular plants. Global change and land use conversion affects grasslands worldwide, threatening biodiversity and ecosystem services. In Uruguay, grasslands have largely decreased in the last decades in favor of soy and afforestation. The NSBAP and PAAP emphasize the importance of preserving grasslands in the following Aichi targets:

- 5a: Get to know by 2018, the conservation status of the main continental ecosystems of the country (grasslands, native woods and wetlands), through the elaboration of Red Lists of Ecosystems;
- 13a: By 2020, a national cartography of grassland communities is made as well as proposals for its conservation;
- 7d: By 2020, 80% of cattle land will promote actions of sustainable production for the conservation of natural grasslands;
- 3c: By 2020, there'll be proposals for incentives for the conservation of grasslands, wetlands and native woods to be set forth in the whole country;
- 9a: By 2016, Uruguay will have a registry of alien invasive species as a grounds for following management actions;
- 9b: By 2017, Uruguay will have a risk classification for each of the main alien invasive species;
- There'll be better representation of grasslands in new or updated of protected areas (PAAP).

There's a bottleneck for many lines of research related to this ecosystem as open access sequence databases have gaps on data for regional species. Thus, it's fundamental to build a comprehensive DNA reference database to assess and manage biodiversity of this ecosystem.

In 2014, an inter-institutional research group discussed the implementation of DNA barcoding nationally and agreed to start focusing on specific case studies for a better organization of a National Node for the International Barcode of Life Network (iBoL). Postgraduate students and researchers know or have heard about this technique or methodology and interest has already been shown in participating in it; this is an opportunity for several participants to benefit from in-depth hands-on training that they can subsequently disseminate to their colleagues. We propose then, to focus this training course on expanding the sequence database with key species of grasslands supporting the national Action Plans and establish a National Node for iBoL by involving interested parties.

The proposal itself and its arguments show how the actions of the Capacity-building Strategy for GTI (COP11) have been already included in the NBSAPs and PAAPs.

**Project outline**

The course is aimed to technicians from different national institutions, public and private, as well as postgraduate students who will be supported by PEDECIBA, the national postgraduate program (Programa de Desarrollo de las Ciencias Básicas).

This training event will last two weeks with a workload of six hours per day (seminars and hands-on modules), totalizing 10 working days and 60 hours of training. We expect 10-12 trainees from different national institutions (research, academic and governmental institutions) around the country and 5-7 postgraduate students from PEDECIBA. Six instructors and three lab assistants are already confirmed to be involved in this proposal.

Before the course begins, two meetings will be held with experts on pastures ecosystems and livestock production on native grazing systems. Taxonomists will also be invited. The main focus of these sessions will be to compile a list of key species with relevance to grassland ecosystems sustainability and livestock.

During the course, each involved institution is expected to choose one or more taxonomic groups of species depending on their expertise and interest. In addition, the key species selected with the experts from previous meeting will be included. The trainees will be able to learn and also perform the DNA extractions and all processing for sequencing. A short training in fieldwork to collected samples will be organized during this period. All activities will be planned and guided by those with experience in DNA Barcoding. Two taxonomists will also assess these activities, since it is relevant to have a precise taxonomic determination, and also a botanical voucher specimen correlated with the DNA sequence.

Trainees will be able to analyze their own samples otherwise test samples will be assigned to each one of them.

The course will have three main modules: collections, laboratory and bioinformatics, and three lectures: i) iBOL Argentinian experience, in charge of Pablo Tubaro (Museo Argentino de Ciencias Naturales "Bernardino Rivadavia"); ii) BOLD platform and biodiversity collections, in charge of Rosina Seguí (Information Management, DINAMA-MVOTMA); iii) Relevant international agreements and Biodiversity National priorities in charge of Victor Canton (DINAMA-MVOTMA).

Two work meetings will also be held in order to prepare the establishment of the national node of DNA Barcoding. Decision-makers from the government, university and private institutions are expected to participate. Subjects to be discussed should include start model of functioning, assessment of capabilities and leadership of each institution, budget opportunities and proposals.

### **Post-Project Follow-up Activities**

After the course we will work to strengthen the Barcode Native Plants Network through workshops and the increase on sequences uploaded to BOLD and new species sequenced from other ecosystems. Also and related to this, other high rank taxonomic groups will be added to the pool (arthropods, birds, mammals, lichens, fungi, etc.). This is expected to result in new partners from other labs and institutions.

We will continue the assessment of actual laboratories in their infrastructure requirements as well as reagents and other lab material needs.

There will be a follow-up on participants trained in this course, their performance with iBOL platform and other needs, through email lists and ad-hoc meetings for at least a year after the training.

There will be a close follow-up of the steps taken towards the creation of the national node of iBOL which will involve meetings with high rank officials from different institutions and looking up for funds, whether if it's from within the institutions or a loan from an international found.

## ***Section 2: Logic model***

### **Project objectives**

To organize teams and lab activities with the attendants in order to be able to sequence at least 50 vouchers from the key list elaborated on initial meetings and those added by the trainees based on particular interests from their Institutions or Agencies.

Work together with collections specialists and expert taxonomists in order to prepare and image the vouchers and effectively include them in a herbarium.

Work thoroughly with the BOLD platform, to understand its potential as a tool and the concept behind an organized database.

Create the Native Plants Barcode Network with inter-institutional participants from academia (University and IIBCE), National Institute of Agro Research (INIA) and government (MVOTMA and MGAP).

Involve key elements in the materialization of a National Node of DNA Barcoding: agricultural and technological institutes (INIA, LATU, SOUL); environmental government agency (DINAMA); agriculture livestock and fisheries government agency (MGAP); National Natural History Museum (MNHN); NGO Alianza Pastizal, inter-institutional parts (Mesa Ganadera de campo natural) and academia National University and Basic Science Postgraduate (PEDECIBA-Udelar).

### **Expected project outcomes**

A group of researchers and post-doctoral students trained on the logic frame of DNA Barcoding, lab techniques and post sequencing analysis.

The target trainees from different fields (government, technical, NGOs) will have the capacity to understand and transfer the potential of this methodological approach to the biodiversity inventory. Meanwhile, they understand the powerful potential of these techniques to develop research project on sustainable agrarian activities.

A national reference library of DNA barcodes for native grasses created with at least 15 BOLD users and one BOLD project.

The Barcode Native Plants Network created with a stated organizational chart, main coordinator and lab delegates.

Concrete actions towards the establishment of the National Node for the DNA Barcoding, as an operational and decision making scheme, list of institutions parties, budget commitment, mission and main objectives. This national node should promote this methodology in research projects and increase the national biodiversity surveys via barcoding as well as support analytical facilities and the access to national and international funding sources.

### **Performance Indicators**

Three news per week and daily follow-up of the activities are going to be posted on the IIBCE (hosting institution) FB profile and blog, identified with its distinctive hashtag (elblogdeliibce.wordpress.com; fb: IIBCEUruguay), which can be measured.

Number of invitations sent, number of actual participants and attendance to lectures and work meetings.

Three meetings in five months with government officials and institutions that participated in the proposal to form the national node.

Increase on sequences uploaded from Uruguayan institutions to BOLD within grasslands projects or projects from other taxonomic groups. Activity in BOLD platform, such as editing files, uploading sequences, performing analysis, number of active users.

A full report of training activities and event. This report will be posted on the IIBCE website and will be shared with participants, partners and stakeholders. Finally, it will be presented to the National Node for the DNA Barcoding.

### **Section 3: List of applicants and facilitators**

#### **Lead applicant**

Mariana Cosse  
 Instituto de Investigaciones Biológicas Clemente Estable (IIBCE)  
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 Uruguay

#### **Co-applicants**

<b>NAME</b>	<b>INSTITUTION</b>	<b>E-MAIL</b>
Rosina Seguí	Dirección Nacional de Medio Ambiente - MVOTMA	rosina.segui@mvotma.gub.uy
Victor Cantón	Dirección Nacional de Medio Ambiente - MVOTMA - NFP CDB	victor.canton@mvotma.gub.uy

#### **Team members**

<b>NAME</b>	<b>INSTITUTION</b>	<b>PRIMARY ROLE</b>
Mariana Cosse	IIBCE	Event Coordinator
Rosina Seguí	DINAMA MVOTMA	Stakeholder/sponsor
Victor Canton	DINAMA MVOTMA	Stakeholder/sponsor
Susana González	IIBCE	Training Instructor
Felipe Lezama	Facultad de Agronomía UdelaR	Training Instructor
Pablo Speranza	Facultad de Agronomía UdelaR	Training Instructor
Magdalena Vaio	Facultad de Agronomía UdelaR	Training Instructor
Cecilia Da Silva	Espacio de Biología Vegetal del Noreste Centro Universitario de Tacuarembó UdelaR	Training Instructor
Gonzalo Figueiro	Facultad de Humanidades y Ciencias de la Educación UdelaR	Training Instructor
Andres Iriarte	Instituto de Higiene UdelaR	Training Instructor
Natalia Mannise	IIBCE	Support staff
Nadia Bou	IIBCE	Support staff
Yanina Leoni	IIBCE	Support staff

**Training Instructors**

NAME	AREA OF EXPERTISE	INSTRUCTION TOPIC
Mariana Cosse	Molecular ecology	Genetic markers, environmental DNA
Susana González	Conservation genetics	Museum collections and DNA
Magdalena Vaio and Pablo Speranza	Plant Genetics	Nuclear and organelle DNA in plants
Felipe Lezama and Mauricio Bonifacino	Plant Ecology, Taxonomy and Systematic.	Collection and herbarium and plant phylogeny
Pablo Tubaro	Taxonomy and Systematic. Ornithology	Barcode of Life Project. DNA barcoding methods.
Victor Cantón	Director Biodiversity Division (DINAMA)	Convention on Biological Diversity: goals and commitments
Rosina Seguí	Information Management (DINAMA)	Biological information databases
Cecilia Da Silva	Biotechnology	Editing and sequence alignment
Gonzalo Figueiro	Ancient DNA	Contamination control associated with DNA extraction and PCR
Andres Iriarte	Bioinformatics	Management of large sequence database

**Section 4: Background Information on Facilitators and Participants****Background of Applicants and Instructors**

The applicants and instructors team combines diverse skills that help us to develop this course in its different stages. Dr. Cosse has experience in molecular ecology; she is developing research on trophic ecology based on molecular determination of mammals and plants species in wild mammals' diet. Dr. Susana González has experience in conservation genetics, and has participated and coordinated international workshops in her expertise area. Dr. Tubaro has been involved in DNA barcoding since 2004; he is a member of the International Scientific Cooperation Committee of the iBOL project. In addition, Dr. Tubaro has been in charge of the course "9th Workshop of Training of Laboratory Leaders: Extension and improvement of DNA barcode research in Argentina and neighboring countries". In 2014, Rosina Seguí was delegate from DINAMA to an *ad hoc* working group that evaluated the capability of a national scheme for iBol. She was invited to participate in the training course at BIO Guelph Canada where she had hands-on training in DNA barcoding. Felipe Lezama and Mauricio Bonifacino are plant taxonomists, they will be in charge of specimen collection, taxonomy and voucher preparation. Dr. Magdalena Vaio and Pablo Speranza are experts in plant genetics, addressing problems related to the characterization of the phylogenetic variability and the evolutionary mechanisms that generate it. Dr. Gonzalo Figueiro is specialist in ancient DNA and DNA lab user guidelines and contaminations controls. Dr. Andres Iriarte and Cecilia Da Silva are experts in bioinformatics software to DNA analysis. Lab assistants MSc. Natalia Mannise and MSc. Nadia Bou have experience in practical laboratory teaching. Nadia Bou attended the 2014 edition of iBol course conducted in Buenos Aires.

**Partners and stakeholders**

We have contacted several institutions which are directly involved either on the management aspects of this subject (like DINAMA, Agronomy Faculty UdelaR, PEDECIBA-Unidad de Valorización y Transferencia Tecnológica, AUCI) or on the research aspects (IIBCE-MEC, PEDECIBA-Facultad de Ciencias). The technicians involved in this proposal are highly capable and work directly or have expertise in genetics, sequencing and grasses taxonomy. Some of us have had direct experience on DNA Barcoding and iBol.

**Trainees**

A restriction to achieve the global objectives (ABT/SDG) related to the conservation of grasslands is the lack of basic information, necessary to develop conservation programs. To reach this objective, generation of databases on pasture biodiversity is required. We believe that the launch of a major program on native grassland species sequencing is a milestone in the right direction.

With the sequences databases on a particular biological community, it is possible to develop powerful molecular ecology strategies that allow to answer questions aimed at the development of sustainable and efficient production strategies and ecosystem conservation. The participants of this course will be technical staff and professionals working on biodiversity conservation, applied taxonomy, and regulatory agencies. We aim to recruit participants from technological institutes (INIA, LATU, SOUL); government (DINAMA and MGAP); NGOs: "Alianza por el Pastizal" and inter-institutional parts: "Mesa Ganadera de campo natural". Regarding the students, there'll be a quota exclusively for those enrolled on the National Postgraduate Program PEDECIBA, which is partner of this proposal. These trainees will have the capacity to transfer the potential of this methodological approach to their institution and develop different kinds of project based on iBol methodology, from food traceability to biotechnological techniques to determine the preference and palatability of native pastures.

Uruguay is in the top 10 countries with the highest internet connection with fiber optic. A communication scheme will be established with the participants via e-mail. Social media like FB and twitter will also be available. Finally, a virtual learning environment (EVA) will be used as a tool for the development of the course.

**Trainee selection criteria**

We will announce the course in different social media and academic forums. At the same time, we will send invitations to the different institutions and NGOs mentioned above. We will make a ranked list of applicants based on the representation of different kinds of institutions (government, technical, NGOs) and diverse skills in order to cover a wide range impact.

In Uruguay, more than half of the population lives in Montevideo where the IIBCE is placed. There is good public transportation. We will have seven scholarships to cover accommodation costs for both technicians and students who live 80 km or more from the Institute. The scholarships will cover 35 - 45% of the expected places. It will be considered to have a balance in the participants' gender.

**Expected Number of Trainees**

We expect 10-12 technicians and professional trainees, and 5-7 postgraduate students from PEDECIBA.

## **Section 5: Training Venue and Logistics**

### **Hosting Institution**

The "Institute of Biological Research Clemente Estable" - IIBCE (<http://www.iibce.edu.uy/instituto.htm>) is a public, non-profit institution of more than 90 years, working under the Ministry of Education and Culture (MEC), dedicated to advancing biological research and education. Today, IIBCE has over 200 researchers and 20 administrative staff.

IIBCE research projects are made possible through a growing number of partners, including private foundations, governments, international institutions, corporations, and non-governmental organizations. The funds are administrated by the "Clemente Estable Institute Support Foundation" – FAICE; a non-profit organization. The objective of FAICE is to provide administrative and management support for the accurate development of research projects from research staff at the IIBCE. FAICE 2017 budgets was US\$ 687.197,00 from several national and international supporters. For further information, please visit <http://www.faice.org.uy/>.

### **Training Venue**

The institute has the facilities for the development of this course with a floor plan consisting of approximately 2,000 m<sup>2</sup> of construction, recently remodeled. The laboratory has 75 m<sup>2</sup> and it is equipped for molecular genetics (fastprep®, microcentrifuge, vortex, heating block / incubator capable of heating to 70 °C, pipettes multichannel, pipettes, thermocycler, PCR workstation, gel rig and imaging system, power supply). The Institute also has a conference room, a computer room with internet access and other facilities for lectures and seminars. We expect 15-20 trainees, who will work in two groups of 8 to 10 with three lab assistants. The groups will work in different turns for hands-on training, seminars and computer lab.

### **Training Activities**

D1

Activity1: Lecture: Introduction to the International Barcode of Life Project

Act.2: DNA Barcoding methods for terrestrial plants

Dr. Tubaro Conference

D2

Act.1 Lecture: Vouchers, Field collecting, specimen processing, data basing, imaging

Act.2 Lab work: Lab Control of Contamination

Act.3: Student seminars

D3

Act.1: Lecture: Plant genetics: nuclear-organelle DNA.

Act.2: Lab work: DNA extraction

Act.3: Student seminars

D4

Act.1: Lecture: Plant genetics: Gene markers variability.

Act. 2: Lab work: Introduction to PCR

Act.3: Student seminars

D5

Act.1: Seminar: Barcoding projects.

Act.2: Lab work: PCRs, products purification. Pasteur Institute platform will be responsible for the sequencing of two 96-well plates at the weekend. We have already agreed with this technical service to carry out this work in these conditions.

Act.3: Student seminars

D6

Act.1 Lecture: Bioinformatics: BOLD

Act.2: Bioinformatics Lab: Sequences edition, Alignment, Database Search and Annotations

Act.3: Student seminars

D7

Act.1 Specimens collection

Act.2 Bioinformatics Lab: BOLD System

Act.3 Student seminars

D8

Act.1 Voucher preparation

Act.2: Bioinformatics Lab: BOLD System.

Act.3: Student seminars

D9

Act.1 Bioinformatics: Introduction to metabarcoding

Act.2 Seminar: Metabarcoding projects.

D10

Act.1: Conference: Uruguayan Barcode of Life: assessment of capabilities and leadership of each institution, budget opportunities and proposals. V.Canton

Act.2: Farewell party

### **Project Logistics**

The "Instituto de Investigaciones Biológicas Clemente Estable" (IIBCE) is located in Montevideo, easily accessed by bus or car in 15 minutes from the commercial center of the city. We offer scholarships for 30-40% to the trainees, who live outside de city. This will include hotel and breakfast. In addition, we will serve a coffee break to all the participants. In the same block of the Institution there is available a market where there are different food stores, which includes foods for diabetics and food allergies. The institute has dining areas with refrigerators, microwave, dishes and washing area.