

ANNEX III**APPLICATION FORM INCLUDING THE TRAINING COURSE PROPOSAL****Section 1 - Background On the Training Proposal****Project Title**

Applied Training on DNA Barcoding of Plants to Build Expertise for Taxonomic Analysis

Preamble

Turkey is one of the world centers for plant biodiversity due to its geographical position. At the intersection of the Mediterranean and Near Eastern Centers, Turkey is a center of origin and diversity for many economically important plant species and a country rich in endemic plants. Despite this rich biodiversity, molecular studies to record this biodiversity in Turkey are in their infancy. According to the 5th NBSAP, plant genetic resources are paramount for Turkey (A.1.2.4) and a comprehensive biodiversity inventory is underway (to be completed in 2018, A2). As such, plant inventories (morphological or molecular) can be considered under most NBSAP goals:

Goal 1: To identify, protect and monitor biological diversity components which have importance for Turkey;

Goal 3: To identify, protect and benefit the components of genetic diversity, including the traditional knowledge, which have importance for Turkey;

Goal 4: To identify, protect and monitor the components of biological diversity which have importance for agricultural biological diversity; to protect genetic resources which have actual and potential values for food and agriculture, and to ensure the sustainable use of such resources; and to ensure the fair and equitable sharing of the benefits arising out of the utilization of genetic resources;

Goal 5: Steppe biological biodiversity;

Goal 6: Forest biological biodiversity;

Goal 7: Mountain biological biodiversity;

Moreover, the 10th goal specifically addresses the need to establish cooperation and coordination between institutions with the aim of protecting Turkish biodiversity. Within this national context, this proposed training will be offered to researchers who are planning to incorporate DNA barcoding into their work, for biodiversity conservation and rapid identification of plant species of interest (e.g., endemic species, wild relatives of cultivated plants, economically important species). Turkey values the collaboration among universities, governmental and private sector and this training will bring all these parties together to receive expertise in standard DNA barcoding methods for future dissemination at the national level. The outcome is in accordance with 2020 goals, to provide a knowledge management system, capacity building, transfer and use of technologies related to biodiversity conservation, reaching Aichi targets and biodiversity targets of Turkey.

Project Outline

The training project is planned to last for 7 days, and will have the following audience: 12 researchers from several governmental and non-governmental organizations, universities and private sector. The trainees will receive training from 7 different experts on both the theoretical, as well as, applied aspects of DNA Barcoding.

The training will consist of lectures, discussions, hands-on lab work and computer-based exercises as follows:

Lectures 10%: Theoretical aspects of both experimental and computational part, as well as, safety briefing will be provided. The lectures will be performed on the Morning session of Day 1 (General introduction to DNA barcoding and detailed experimental aspects, biodiversity and legislation), and Afternoon session of Day 1 (Bioinformatics, aspects of DNA barcoding workflow, specimen collecting and tissue sampling).

Discussion on policies and biodiversity 10%: It will cover national and international policies on biodiversity with the aim to propose possible action points. Morning session of partly Day 1 and in the last two days will be dedicated to this discussion yet discussions scattered throughout the training will be encouraged.

Experimental work: 40%. Hands-on work, covering sampling from field and storing until further analysis, tissue lysis, DNA isolation, PCR amplification, gel extraction and sequencing. Days 2-3 will focus on experimental work. In addition, the topics of laboratory safety and working rules will be explained.

Computational and bioinformatics work: 30%. It will cover standardized workflows and hands-on work on DNA sequence analysis, phylogenetic tree generation and database (both BOLD and National Plant DNA Barcoding database) use (search and new entry). Day 4-5 will focus on the bioinformatics work.

Presentations and scientific discussions: 10%. It will cover the presentation and discussion of the obtained results. This will occur in Day 7.

Post-Project Follow-up Activities

The following post-project follow-up activities are envisaged:

- Coordinate nation-wide Plant DNA Barcoding studies;
- Disseminate and promote the know-how of DNA Barcoding beyond plant taxa.
- Collaborate with different trainers to create and coordinate various plant working groups;
- Promote the National DNA Barcode Database to ensure information flow from other researchers. On long-term, this will be a portal to promote barcoding for broader (beyond scientists) audience;
- Coordinate and apply to alternative funding bodies for large-scale barcoding studies;
- Draft and present memoranda to support politicians/law makers for the integration of DNA-based diagnostic approaches to local legislations and laws;
- Generate public awareness using, in particular, social media, as well as, local news.

The applicant has already secured funding from Ministry of Food, Agriculture and Livestock on DNA Barcoding of (Endemic) Plants. The short-term plan is to submit an additional proposal to the Ministry of Development and TUBITAK (The Scientific and Technological Research Council of Turkey) aiming to generate a molecular inventory for various species of wild relatives of commercially significant crops.

Section 2 - Logic Model

Project Objectives

- To provide training in DNA barcoding (fundamentals and applications) to researchers working for governmental organizations, universities, private sector and NGO's, who can follow and conduct related research and further disseminate merits of barcoding;
- To ensure that target audience actively uses and contributes to national and international databases (information in the national database will be accessible to everyone);
- To explain and disseminate further the importance of recording the national genetic resources related to biodiversity. In this perspective, international databases will be investigated and information workflow will be provided between national and international databases;
- To lay groundwork to provide technical support and infrastructure to policy makers in adhering to international legislation/regulations related to fair and equitable sharing of genetic resources; and
- Give information to scientific, administrative as well as technical staff about importance of DNA barcoding.

Expected Project Outcomes

- DNA Barcodes, pictures and taxonomic information of plant species of national interest will be added to BOLD and to the newly-established and available National DNA Barcoding database. Plant species will be covering all major geographic regions of Turkey;
- Dissemination of the results via a "white paper" to increase public awareness on DNA barcoding;
- A plan including the scope, audience and content of training schemes to be provided in the coming years;
- Participants to this training event will have the opportunity to increase their expertise with the goal of becoming trained trainers in DNA barcoding in the near future and increase the barcode coverage of Turkish fauna and flora;
- New applications for funding for DNA barcoding projects will be submitted to governmental institutions such as TUBITAK (The Scientific and Technological Research Council of Turkey) and Republic of Turkey Ministry of Development.

Performance Indicators

- Total of 96 plant samples will be analyzed and the records will be uploaded to BOLD, to be released after the completion of the GTI training
- A 'white paper' on the importance of DNA Barcoding for biodiversity inventories and routine identification of national priority species will be published;
- Articles on the workshop activity published in local newspapers for public awareness;
- News about the progress during training will be posted on the institution website or social media (Facebook, Twitter etc.).

Section 3 - List of Applicants and Facilitators

Lead Applicant Name	Dr. AYŞE YILDIZ
Institution	Field Crops Central Research Institute
Address	Şehit Cem Ersever Cad. No:9/11 Yenimahalle/ANKARA
Work phone	90 312 343 10 50
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Co-Applicants

Name	Institution	Email
Dr. Kürşad ÖZBEK	Field Crops Central Research Institute	ozbekkursad@yahoo.com
Asst. Prof. Dr. Bahar SOĞUTMAZ ÖZDEMİR	Yeditepe University, Faculty of Engineering, Department of Genetics and Bioengineering	bahar.sogutmaz@yeditepe.edu.tr
Asst. Prof. Dr. Emrah NİKEREL	Yeditepe University, Faculty of Engineering, Department of Genetics and Bioengineering	emrah.nikerel@yeditepe.edu.tr
Associate Prof. Dr. Emre KESKİN	Ankara University Fisheries and Aquaculture	keskin@ankara.edu.tr

Team Members

Name	Institution	Primary Role (select from dropdown)
Dr. Kürşad ÖZBEK	Hosting Institution	Training Instructor
Asst. Prof. Dr. Bahar SOĞUTMAZ ÖZDEMİR	Partner Institution	Training Instructor
Asst. Prof. Dr. Emrah NİKEREL	Partner Institution	Training Instructor
Associate Prof. Dr. Emre KESKİN	Partner Institution	Training Instructor
Bengü ESMER KOYUNCU	Hosting Institution	Training Instructor
Dr. Hüsnüye KILIÇARSLAN	Partner Institution	Training Instructor
Muharrem CİHAN	Hosting Institution	Support staff
Yusuf COŞKUN	Hosting Institution	Support staff

Training Instructors

Name	Area of Expertise	Instruction Topic
Dr. AYŞE YILDIZ	Molecular biology of plant	DNA Barcoding Protocols, laboratory analyses, laboratory safety
Dr. Kürşad ÖZBEK	Conservation and characterization of plant genetic resources	Biodiversity, laboratory analyses
Asst. Prof. Dr. Bahar SOĞUTMAZ ÖZDEMİR	Molecular biology of plant	DNA Barcoding Protocols, laboratory analyses

Asst. Prof. Dr. Emrah NIKEREL	Metagenomics	Bioinformatics
Associate Prof. Dr. Emre KESKİN	Metagenomics	Bionformatics
Dr. Hüsniye KILIÇARSLAN	GEF implementing agency (UNDP, UNEP regional offices)	Legislation
Bengü ESMER KOYUNCU	Informatics	Bioinformatics
Yusuf COŞKUN	Technician	Support for Laboratory Work

Section 4 - Background Information on Facilitators and Participants

Background of Applicants and Instructors

The lead applicant, Dr. Ayşe YILDIZ, has taken "Hands-on Training Course on Rapid Identification of Invasive Alien Species for Achieving Aichi Biodiversity Target 9" in 2016. She is working in the Ministry of Food Agriculture and Livestock, General Directorate of Agricultural Research and Policies. The General Directorate is the institution responsible for the preparation of legislation and policies on agricultural research in Turkey and the lead applicant has extensive experience in this field. She is also part of a National DNA Barcoding project for Turkey, leading the biotechnology group in this project. She has a PhD thesis and multiple publications related with Molecular Assisted Selection and genetic diversity in plants.

Instructors:

Dr. Kürşad ÖZBEK has been working on plant biodiversity for more than 15 years as leader and researcher of about 30 projects. He is also the founder of the Turkish Seed Gene Bank.

Dr. Bahar SOĞUTMAZ ÖZDEMİR is working in the area of plant biotechnology with an expertise on plant genetics, tissue culture and genetic engineering. She has been working as a faculty member at Yeditepe University, Department of Genetics and Bioengineering since 2014.

Dr. Emrah NIKEREL received a PhD degree from Delft University of Technology. He has been working on bioinformatics, biostatistics, microbial metabolism, computational biology, mathematical modelling studies in system biology.

Associate Prof. Dr. Emre KESKİN has been working on DNA Barcoding, eDNA Metabarcoding, evolutionary genetics, phylogenetics, population genetics in Ankara University.

Dr. Hüsniye KILIÇARSLAN has been working at the Republic of Turkey Ministry of Forestry and Water Affairs, General Directorate of Nature Protection and National Parks Department as Director of Biodiversity Branch Director.

Bengü ESMER KOYUNCU has been working in database design for 9 years, specializing in plant genetic resources software systems for 4 years.

Partners and Stakeholders

- National CBD Focal Point (Ministry of Forestry and Water Affairs General Directorate of Natural Protection and National Parks).
- Ministry of Food, Agriculture and Livestock, General Directorate of Agricultural Research and Policies, Department of Field Crops Researches - In kind (theoretical lectures and hands-on training, ground transportation, internet, training material)
- Ministry of Forestry and Water Affairs - Cash (theoretical lectures, printing training materials (manuals, USB, notebook etc..))
- Yeditepe University – In-kind support (DNA isolation kit supply, theoretical lectures and hands-on training)
- Ankara University (theoretical lectures and hands-on work training)
- SYN Biotechnology and Foreign Trade Ltd. Co.- In-kind support (chemicals supply for DNA barcode analysis in the laboratory)

Trainees

- Trainees must have Master and/or PhD degree, or maintain their postgraduate education in the fields of Agricultural Engineering, Agricultural Biotechnology, Biology and Genetics on plants.
- Trainees who are selected from public enterprises must be staff of research institutions of Ministry of Food, Agriculture and Livestock, General Directorate of Agricultural Research and Policy Development and Ministry of Forestry and Water Affairs.
- Trainees who are selected from universities must be students of Agricultural Engineering, Agricultural Biotechnology, Biology and Genetics departments country-wide.
- Trainees who are selected from private sector must be working for plant seed companies.
- Trainees who are selected from NGO's must be working on plant biodiversity and genetic resources.

This training aims to contribute to biodiversity conservation in Turkey and to coordinate DNA barcoding efforts among governmental institutions, universities, private sector and NGOs. Targeting already highly-skilled audience for training aims to boost research in this area in the near future, since the trainees are expected to conduct independent research in relatively short term. The majority of the trainees will be from governmental institutions, as this is essential in achieving Aichi Target 19. Turkey values the collaborations among different parts (GO, NGO, Academia, private sector etc), such that bringing trainees together will also allow building and/or strengthening networks among the participants. Finally, the training aims to popularize DNA barcoding projects and in line with 2020 goals, this project will provide countrywide knowledge management, capacity building/increase in reaching Aichi and NBSAP targets, via spreading, transferring and applying the technologies thereof.

Trainee Selection Criteria

Trainees will be selected from those who may be involved in biological diversity and DNA barcoding projects in terms of post-training working and availability of infrastructure conditions. Gender balance will be sought during the selection process. Academic qualifications are an important asset and participants will need to have at least Bachelor degree in a relevant field (e.g., biology).

Expected Number of Trainees

In order to make efficient and sufficient use of laboratory infrastructure, adequate number of trainees is determined as 12 (7 from governmental institutions and organizations, 3 from universities, 1 from private sector and 1 from NGOs).

Section 5 - Training Venue and Logistics

Hosting Institution

- The Food Crop Central Research Institute (FCCRI) is part of the Ministry of Food, Agriculture and Livestock, the authority on biodiversity protection in Turkey. FCCRI is responsible for following up the technological developments of agricultural research and production, putting into practice, creating solutions for territorial problems, being a center of education in science and technology, providing the coordination and connection between the biotechnology institutes and researchers, producing national or international projects and developing high quality and yield plant varieties (economically advantageous). Annual earning of FCCRI is 3 million US\$ and about half of the amount (1.6 million US\$) is used to run 62 projects

- Five staff of FCCRI will be employed for educational activities (3 trainer instructor and 2 support staff) during training

Ayşe YILDIZ-Biotechnology Research Center (Lead applicant)

Dr. Kürşad ÖZBEK- Biodiversity and Genetic Resources (Trainer instructor)

Bengü ESMEER KOYUNCU- Biodiversity and Genetic Resources (Trainer instructor)

Muharrem CİHAN- Geographic Information Systems (Support staff)

Yusuf COŞKUN - Biotechnology Research Center (Support staff)

- The in-kind/cash support will be obtained from the following parties: The cost of educational materials of about \$1353 will be supported by the MoFWA. The cost of communications, training venue, equipment, infrastructure, staff salaries and some meals and catering of about \$4935 will be supported by the MoFAL. The cost of reagents of about \$1200 will be supported by the Yeditepe University. Also, the cost of reagents of about \$5625 will be supported by the SYN BIO (The biotechnology company in Turkey). In our organization, indirect cost is made transparent/registered according to Turkish State Law.

- 10% increase of budget is foreseen as a result of the fluctuating exchange rate, change in price for reagents and consumables, airfare and possible delays in signing various agreements.

Training Venue

All training (including molecular analysis (DNA isolation, PCR, DNA seq. etc.)) will be held at Biotechnology Research Lab in Central Research Institute for Field Crops. This institute provides molecular training to scientists of other research institutes twice each

year. Its laboratories (totally 7) are available to perform applied training for 10-15 individuals and include necessary equipment (pipettes, centrifuge, vortex, etc.). The accommodation will be carried out in the nearby places which do not require transportation by car. Central Research Institute for Field Crops was established in 1926. It has 900 ha. area, 1 Gene Bank, 350 staff, 4 green houses, meeting rooms, 350 m² laboratory space, ABI-3500 DNA sequencer, nucleic acid isolation robot, homogenizer, RT-PCR, Bioanalyzer, pipettes, incubator, centrifuge, thermocyclers, electrophoresis set-up, gel imaging system, vortex mixer and 120,000 accessions (plant samples) Trainees will be divided into 3 groups of 4 persons. These 3 groups will simultaneously perform each experiment under the supervision of 3 different instructors. Each group will use a third of a 96-well plate and totally 1 plate will be required during training. Actual collections will be analysed and sequenced in-house. DNA extraction reagents, sample tubes or 96-well plates, PCR reagents, gloves, Hi-di formamide, 3500 Genetic Analyzer 8-Capillary Array, 50 cm, Anode-Cathode buffer, size marker, POP7, AmpliTaq, BigDye, Ethanol, eliminase etc. will be used. Real data will be analysed from the above. Bioinformatics analysis will be performed in the meeting rooms of Biotechnology Research Center with the Wi-Fi internet connection. For bioinformatics analyses, standard software suites will be used for sequence manipulation, comparison, alignment of barcode data and tree generation (e.g. Molecular Evolutionary Genetics Analysis (MEGA), Ugene). Additionally, a collection of programs focusing on analysis of Barcoding data will be used for in particular database use, e.g. www.boldsystems.org, CodonCode for assembly and sequence alignments, sequence editing, end clipping, translations etc.

Training Activities

Training activities are planned between 26 June - 2 July 2018.

26 June 2018 – Tuesday

- **09.00-09.30:** Meeting with visitor training team
- **9.30-10.15:** DNA Barcoding (Presentation) - Asst. Prof. Dr. Bahar SOĞUTMAZ ÖZDEMİR,
- **10.15-11.00:** Biodiversity (Presentation) - Dr. Kürşad ÖZBEK
- **11.15-12.00:** Bioinformatics and Data Analysis (Presentation) - Asst. Prof. Dr. Emrah NİKEREKEL
- **13.00-13.45:** BOLD System (Presentation) - Associate Prof. Dr. Emre KESKİN,
- **14.00-18.00:** Specimen Collecting and Tissue sampling (Institution's area and Gene Bank material), Specimen imaging - Dr. Kürşad ÖZBEK, Dr. Ayşe YILDIZ

27 June 2018 – Wednesday

- **09.00-18.00:** Laboratory safety, tissue lysis and DNA extraction - Dr. Ayşe YILDIZ, Asst. Prof. Dr. Bahar SOĞUTMAZ ÖZDEMİR, Dr. Kürşad ÖZBEK, Yusuf COŞKUN

28 June 2018 – Thursday

- **09.00-17.00:** PCR, gel electrophoresis - Dr. Ayşe YILDIZ, Asst. Prof. Dr. Bahar SOĞUTMAZ ÖZDEMİR, Dr. Kürşad ÖZBEK, Yusuf COŞKUN,

- **17.00–18.00:** Cycle sequencing (during overnight) - Dr. Ayşe YILDIZ, Asst. Prof. Dr. Bahar SOĞUTMAZ ÖZDEMİR, Dr. Kürşad ÖZBEK, Yusuf COŞKUN

29 June 2018 – Friday

- **09.00–18.00:** Bioinformatics - Asst. Prof. Dr. Emrah NİKEREL, Bengü ESMER KOYUNCU

30 June 2018 – Saturday

- **09.00–18.00:** BOLD and the National Database-Associate Prof. Dr. Emre KESKİN, Bengü ESMER KOYUNCU

1 July 2018 – Sunday

- **09.00–18.00:** The National Biological Diversity Strategy and Legislations (NBSAP, NAGOYA, CITES, etc) - Dr. Hüsniye KILIÇARSLAN

2 July 2018 - Monday

- **09.00-12.00:** Options for the conservation and sustainable use of plant biodiversity – Dr. Kürşad ÖZBEK
- **13.00-17.00:** An evaluation of the training (from participants) and discussions on the outcome and follow-up projects.
- **17.00–18.00:** Certificate Ceremony.

Project Logistics

- Before the training, a website will be created in order to share all information, documents and visuals related to the training event. The link to the new website will be available from the institute's website.
- Training announcement will be circulated by using the website and through correspondence between institutions. Applications will be submitted by using the website. Communication with trainees will be provided by e-mail.
- Transportation will be provided by airplane or road. There will not be any international travelling.
- Accommodation will be provided by the hotel that is within walking distance to the Venue.
- For all of the participants, two meals/day (lunch and dinner) and tea-coffee break will be supplied.
- Cost for venue (conference room and laboratory) usage will be provided by our foundation. Translation service is not necessary.
- All reporting and documents will be completed in a month after the finalization of the training event.