

INRA in collaboration with USDA organize the:

Biotechnology Workshop

18 September 2024

INRA Division Information and communication, Rabat, Morocco

“Biotechnology for a resilient agriculture”

I. Concept note

Agriculture plays an important socio-economic role in Morocco. Climate change, which causes insufficient rainfall and high temperatures, reduces the productivity of the main crops. In addition, the increase in population generates a growing demand for agricultural products. Agricultural research plays a key role in supporting the Generation Green strategy (2020-2030) through several programs aimed at innovative, productive and resilient agriculture. Biotechnology offers many tools leading to applications and products that can contribute to food security and sovereignty,

The objective of the Biotechnology workshop is to present, discuss and propose recommendations on the most recent technologies in biotechnologies that can be incorporated in the R&D programs. These technologies have the potential to address key challenges related to food security and climate change by producing in a more efficient way, more resilient and productive crop varieties and animal races.

It takes from 10 to 15 years to develop a crop variety such as wheat. High throughput genotyping, Genetic editing for example can speed up the process of development. With the progress in genomics, scientists understand better gene function and how to tailor it for the development of crops with more resilience, better productivity and quality.

The workshop would take place in Rabat, and would target researchers from INRA, Ministry of Ag, Moroccan research institutions and academia. USDA is inviting four international speakers and INRA will coordinate the event, invite the participants and provide a venue for the event. All these actions will contribute to the development of resilient agriculture leading Morocco towards food sovereignty.

We selected 4 themes related to crops animals biotechnology and would like to invite 4 international experts in the area and 12 local scientists to present specific case studies. There will be 4 discussion panels to address specific questions.

II. Preliminary Program

8 :30 - 9:00 : **Participants Arrival**

Opening Address

- 9 :00 - 9 :30
 - 9 :00 - 9 :10: Welcome Remarks: Ministry of Agriculture (TBC)
 - 9 :10 - 9 :20: Address by Ambassador Talwar (TBC)
 - 9 :20 - 9 :30: Introduction and Context of the Workshop, Dr. Bekkaoui

Session 1 : Genotyping and Genomics for Conservation

Conservation of local plant and animal genetic resources is key factor in the sustainability of agriculture. Such conservation cannot be achieved without appropriate knowledge of the species, varieties or breeds to be conserved. This knowledge necessarily involves an appropriate characterisation of genetic diversity, considered to be the basic level of biodiversity. The new genomics and other omics` tools enable us to better characterise this genetic diversity at genome level, and to distinguish between neutral and adaptive diversity, in order to better conceive conservation, management and improvement programs for these local genetic resources.

During this session, several topics will be covered, including genotyping techniques for practical variety identification, efforts to characterise the genomes and epi-genomes of local genetic resources of agricultural species with a view to their better management (improvement and conservation) as well as other related subjects.

9 :30 – 10:15

- **Keynote Speaker N°1** (30 min presentation and 15 min Q&A)
 - **Dr. Garland-Campbell (USDA) (Online Presentation)**

10 :15 – 11 :00

- **Speakers (15 min each)**
 - Badr Benjelloun (INRA) Genomics for the conservation and sustainable genetic improvement of local livestock breeds.
 - Ghizlaine Diria (INRA) Rehabilitation and conservation of traditional palm groves in Moroccan oases through Genotyping Approaches
 - Siham Fellahi (IAV II) Enhancing Poultry Health through new Genotyping Approaches

11 :00 – 11 :30 : Coffee Break

Session 2 : Bioinformatics

The goal of this session is to explore and enhance the application of bioinformatics and artificial intelligence (AI) technologies to address the challenges posed by climate change in agriculture. Participants will gain the knowledge and skills necessary to use these advanced tools to improve crop resilience, optimize resource management, forecast and increase agricultural productivity, and develop sustainable agricultural practices. By fostering innovation and collaboration, the aims to develop sustainable agricultural practices that can adapt and mitigate the impacts of climate change.

11 :30 – 12 :15

- **Keynote Speaker N°2** (30 min presentation and 15 min Q&A)
 - Pr Mohamed Zouine, Toulouse, France

12 :15 – 13 :00

- **Speakers (15 min each)**
 - Allali Achraf (UM6P) Les bases de données et serveurs agricoles en biologie végétale: une ressource pour les chercheurs en agriculture
 - Slimane Khayi (INRA) Argania Spinosa: Genome resources improvement
 - Rachid Mentag (INRA) Exploration of the Rhizosphere Microbiome of the Argan Tree

13 :00 – 14 :00 : Lunch

Session 3: Gene Editing

Targeted genome modification technology by CRISPR/Cas9 is a new tool in plant breeding toolbox providing solutions to global challenges by developing improved varieties that are better adapted and more resilient. In this workshop we will explore basics and advanced genome editing systems and their application for sustainable and resilient agriculture.

14 :00 – 14 :45

- **Keynote Speaker N°3 & 4** (30 min presentation and 15 min Q&A)
 - Jaswinder Singh, GEFSES: Gene Editing: A Novel Approach for Decoding and Optimizing Genes in Crop Improvement
 - Gunvant Baliram Patil, Institute of Genomics for Crop Abiotic Stress Tolerance: Developing Technology to Improve De Novo Shoot Regeneration and Genome Editing in Plants” (**Online Presentation**)

14:45 – 15:30

- **Speakers (15 min each)**
 - Anna Backhaus (ICARDA Morocco): Today's challenges and tomorrow's possibilities of genome editing for precision plant breeding
 - Valentine Ntui (UM6P)

15 :30 – 16:00

- **Coffee Break**

Session 4 : Genomics for Breeding

One of the objectives of the workshop is strengthening the breeding activities for major crops using novel tools and approaches, efficient evaluation and selection for tolerance and resistance to abiotic and biotic stress and for improved quality and nutritional attributes.

The most recent technologies in biotechnologies present the potential to address key challenges related to food security and climate change by producing in a more efficient way, more resilient and productive crop varieties and animal breeds. With the progress in genomics, scientists understand better gene function and how to tailor it for the development of crops with more resilience, better productivity and quality. This, remain the main purpose of the Genomics for breeding theme of the biotechnology workshop to be held in Rabat, Morocco on September 18th, 2024.

16 :00 – 16 :45

Keynote Speaker N°5 (TBC)

- (30 min presentation and 15 min Q&A)

16 :45 – 17 :30

- **Speakers (15 min each)**
 - Ahmed El Bekkali (INRA)
 - Bassi Filippo (ICARDA Morocco) : Genotype vs Environment: genomic boosting the ICARDA durum wheat breeding program for dryland cultivation

17 :30 – 18 :00

- **Conclusions and Recommendations**