



RecoBar

NEWSLETTER ISSUE 1 – December 2023/January 2024

Started in January 2023, RecoBar is a European Project selected in the 2021 Joint FACCE-JPI SusCrop Call on Agrobiodiversity in the framework of the European Research Area funding with EUR 1,755,000.



RecoBar is a multidisciplinary project focused on the exploration of the wide diversity harboured by old varieties and landraces of barley for adaptation to shifting climates, discovery and deployment of genes affecting key traits, exploration of targeted modification of known genes, improvement of functional crop growth models applied to genomic prediction with newly unravelled genetic diversity, and evaluation of soil microbiota diversity dynamics in relation to barley diversity.

From its beginning to its completion in December 2025, the 9 partners from 7 different countries (Estonia, Ireland, Italy, Finland, Poland, Spain and Turkey) will be involved in addressing **the four main challenges** of this project, **(1)** Harness extant barley diversity to expand the crop genetic base, **(2)** Mine new traits and Quantitative Trait Loci (QTL) for tolerance to abiotic stresses with new and old diversity, **(3)** design the barley ideotyping for future agroecosystems, and **(4)** decipher the rhizosphere microbiota associations with crop diversity and environmental conditions.



Visit the Project website
www.recobar.eu

Interview with Dr. Ernesto Igartua, coordinator of RECOBAR project

Please introduce yourself and the Estación Experimental de Aula Dei (EEAD-CSIC)



I am a principal researcher in barley genetics and breeding at the EEAD-CSIC, in Zaragoza, Spain. CSIC is the main Spanish public research body, with 126 institutes covering all fields of Science. EEAD is devoted to agricultural sciences, and has a long tradition of studying genetic diversity of cereals and fruit crops, with particular emphasis on local adaptations. We are proud of having developed, over the last 80 years (and counting), crop varieties that impacted positively the Spanish agricultural sector. <https://www.eead.csic.es/home/staffinfo?Id=69>

What is day-to-day life like at your job?

Most of my day is spent at the computer, planning experiments, analyzing results with PhD students and postdocs, and writing scientific articles, grant applications, and other kind of reports. Communication of results is of paramount importance. I miss the days of visiting more often the field trials and greenhouses, but now this is mostly the task of junior researchers and technicians. I still collect some data, though, as first-hand contact with the plants facilitates a better understanding of the results.



Photographed by EEAD-CSIC

What is your role in RECOBAR and what experiments are being carried out?



Photographed by EEAD-CSIC

I coordinate the project, with the invaluable help of our postdoc, Rubén Sancho, my colleagues Ana Casas and Bruno Contreras, and our technicians. At the EEAD, we carry out field trials under low and standard nitrogen fertilization, with a set of assorted barley varieties covering several stages of the history of breeding, from all landraces to modern varieties. Plant breeding has been carried out mostly for high-input agriculture and low-stress conditions. One of the goals of RecoBar is to look again into the traditional genetic diversity to look for adaptations to low nitrogen, high temperature, drought and flooding that may have been overlooked in the past.

What achievements are intended to be achieved in the RECOBAR project?

One possible outcome is finding out old varieties that may have a niche in the low input agriculture that is now fostered by the EU, as well as those better adapted to abiotic stresses (high temperatures, drought, high CO₂ concentrations,...). If that does not happen, at least we will identify interesting adaptation traits that will be useful for plant breeding for the more stressful conditions that we are starting to suffer. There is also a modelling strategy, to incorporate the genetic diversity dimension into crop growth models, and improve on the predictions of variety performance under future climate conditions. Last, but not least, we will explore the genetic diversity of microorganisms present in the soil, and their relation with barley genetic diversity. There is an intense dialogue between the crops and the microbiota around the roots with profound implications on plant performance and health.

Meet the partners!



Prof. Alan Schulman is the Head of Research and Group Leader at the Institute of Biotechnology, University of Helsinki (Helsinki, Finland). His group identifies and applies genetics, genomics and cell biology to understand the processes of genome dynamics, and also pursues the basis of drought resilience and other sustainability traits. <https://researchportal.helsinki.fi/en/persons/alan-schulman>



Prof. Hakan Özkan is a Plant Breeder, Geneticist and Full Professor at the Dept. of Field Crops, Faculty of Agriculture, Cukurova University (Adana, Turkey). His research interests are focused on legumes and cereals genetics and domestication, polyploidization and breeding of cereals for abiotic and biotic stresses. <https://avesis.cu.edu.tr/hozkan>



Prof. Laura Rossini is a Full Professor in Crop Genetics at the Dept. of Agricultural and Environmental Sciences, University of Milan (Milan, Italy). Her research aims at the discovery and functional characterization of genes involved in ideotype traits in crops to better understand plant biology and provide useful knowledge for breeders, mainly focusing on barley. <https://www.unimi.it/en/ugov/person/laura-rossini>



Dr. Alessandro Tondelli is a Senior Researcher at the CREA, Research Centre for Genomics and Bioinformatics (Fiorenzuola d'Arda, Italy). He studies the genetic diversity in cereal crops for the dissection of quantitative traits, through genotypic and phenotypic analysis of mapping populations and germplasm collections. <https://orcid.org/0000-0001-9299-7773>



Dr. Agata Daszkowska-Golec is an Associate Professor at the Institute of Biology, Biotechnology and Environmental Protection, Faculty of Natural Sciences, University of Silesia in Katowice (Katowice, Poland). Her research activity is focused on molecular basis of plants' response to abiotic stress adaptation, with emphasis on ABA signalling and drought response. <https://us.edu.pl/instytut/ibbios/osoby/daszkowska-golec-agata/>



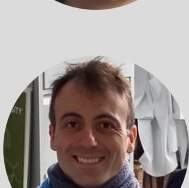
Prof. Hannes Kollist is a Professor of Molecular Plant Biology and Group Leader of Plant Signal Research Group at the Institute of Technology, University of Tartu (Tartu, Estonia). His research is focused on the mechanisms by which guard cells integrate information from outside as well as inside the leaf to adjust plant gas exchange. <https://www.plantsignalresearch.com/>



Dr. Sirja Viitala is a Principal Research Scientist/Research Manager (Genetics and Breeding) at the Natural Resources Institute Finland (Luke) (Helsinki, Finland). Her research is focused on genomics of economically important food crops, improving the quality and quantity of crop yields in agriculture and linking traits to genes to boost crop breeding. <https://www.luke.fi/en/experts/sirja-viitala>



Dr. Sónia Negrão is an Assistant Professor in Plant Sciences at the University College Dublin (Dublin, Ireland). She studies the genetic mechanisms underlying stress adaptation using resilient crop species through the analysis of genomic signatures of stress adaptation by performing association models using naturally occurring genetic diversity and high-throughput phenotyping. <https://people.ucd.ie/sonia.negrao>



Dr. Tancredi Caruso is an associate Professor at the School of Biology and Environmental Science at the University College Dublin (Dublin, Ireland). His research is focused on the processes that structure microbial and animal biodiversity in space and time. He has mostly worked on aboveground-belowground linkages, especially plants and soil and the ecological networks they form, and how terrestrial biodiversity and ecosystem functioning respond to perturbations. <https://people.ucd.ie/tancredi.caruso>

Tasks in progress...

Let's go sow! The sowings for the field trials to study the behavior of old varieties and landraces under low nitrogen inputs and rhizosphere microbiota associations with crop diversity and environmental conditions were carried out in **Italy (CREA)**, **Turkey (UniCu)** and **Spain (CSIC)** during November and December. Next spring it will be sown in **Ireland (UCD)** and **Finland (LUKE)**

(A)



Photographed by EEAD-CSIC

(B)



Photographed by H. Ozkan (Cukurova Univ.)

(C)



Photographed by A.Tondelli (CREA)

(A) Sowing barley in November (EEAD-CSIC-Spain), (B) barley plants growing in Adana-Turkey (Cukurova University) sown in December and (C) in Fiorenzuola d'Arda-Italy (CREA) sown in November

UCD colleagues have developed the **waterlogging stress** protocol to study the response of the plants and the microbiome of the rhizosphere under this abiotic stress condition.



Photographed by UCD

Waterlogging imposition at 4th leaf stage (UCD-Ireland)

UniMi and **Cassandra Lab** colleagues are collecting information of 60 agronomic traits - including key traits for resistance to biotic and abiotic stressors - **to design Barley Ideotypes** more adapted to future climates in Europe.

UniMi colleagues have crossed two **TILLMORE** lines with increased values for **culm traits** with 6-row parents to produce four F2 populations.



Photographed by Valerio Gipli (UniMi)

Barley crosses to obtain segregating populations for big culm trait (UniMi)

UCD colleagues have carried out the pilot study to design the association experiment between **rhizosphere microbiome, crop and environment**.



Photographed by UCD

Rhizosphere Microbiome sampling (UCD-Ireland)

USilesia colleagues are performing the Seedling and Booting stage experiments on ten barley accessions under **drought treatment combined with heat**.



Photographed by Univ. Silesia in Katowice (Poland)

Barley plants under abiotic (drought/heat) stress conditions

News and Upcoming Events

Launch of the **RecoBar** website!

www.recobar.eu



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Save the date **March 7 (14:00 – 15:30 GMT)** to attend the IBH seminar (**online**) entitled "**BEST-CROP and RECOBAR**" in which researchers **Ernesto Igartua (EEAD-CSIC)** and **Tancredi Caruso (UCD)** will talk to us about the challenges and keys of the **RecoBar** project.

Take a look at the link: <https://barleyhub.org/ibh-seminar-best-crop-and-recobar/>

RecoBar meeting 2024 is coming!

See you on March 20 and 21 at the University College of Dublin



Did you know ...?

The English King Edward II issued a statute in 1324 establishing officially that **“three barleycorns, dry and round, make the inch;** and 12 inches make 1 foot; and three feet make the yard;...”

Barleycorns served as a common reference for shoe sizes, with each size increment usually representing one-third of an inch. This practice endured in different cultures and continues to influence shoe sizing conventions today.



Figure created in BioRender.com

Trevnor, R. (2007). *Smoot's ear: the measure of humanity.*

Stuart, M. *The development of footwear sizing systems.* [[The development of footwear sizing systems \(satra.com\)](http://The.development.of.footwear.sizing.systems.satra.com)]



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Photographed by Gozalo F.J.

