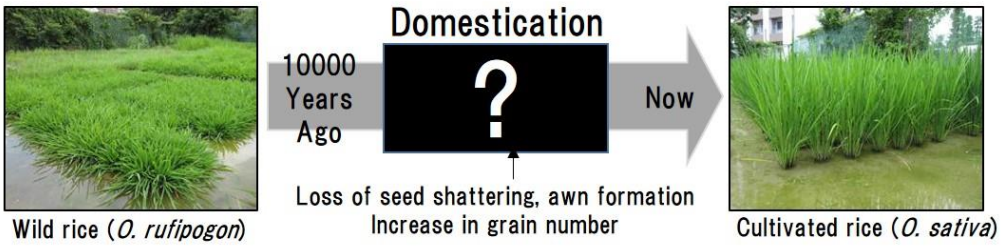
Short Report on JSPS Funded Joint Bilateral Project, "Evaluation of the process of rice domestication: plant molecular genetics meets archaeobotany", by Prof. Dorian Fuller

Description of project

The research was a multidisciplinary study that integrated archaeological data and genetic findings from modern and ancient DNA of rice. The aim is to provide a working hypothesis on the evolution of domestication and post-domestication genes and traits of rice. Rice is one of the most important cereals in the world which feeds more than half of the world's population and therefore, the study of rice domestication is of interest to many researchers, including plant breeders, climate scientists and prehistorians. Furthermore, research organizations tackling environmental sustainability food issues will gain from this research. The rice database developed by the Early Rice Project under my direction includes information on the early history and evolution of rice. Several domestication traits can be seen in the archaeological rice such as loss of seed shattering, loss of awns and an increase in grain size. By evaluating these data together with genetic studies conducted by Ishikawa, Ishii and his team at Kobe University, we aim to resolve key issues regarding the emergence of domestication traits, including the genes responsible for such traits. The research project by Ishikawa has led to future collaborations. Currently, a postdoctoral fellow from my lab is working with Ishikawa, Ishii and his team at Kobe University researching wild rice.



Departments and institutions involved

Japan Dr. Ryo Ishikawa and Prof. Talkashige Ishii, Graduate School of Agricultural Science, Kobe University

UK Prof. Dorian Fuller, Institute of Archaeology, University College London
Prof. Robin Allaby, School of Life Sciences, University of Warwick

How collaboration started

Dr. Ishikawa has visited my laboratory several times. The first meeting took place while he was studying in the UK as a JSPS Overseas Research Fellow at John Innes Centre, Norwich, in March 2013. In this meeting, we discussed future research on crop domestication with Prof. Robin Allaby. Another meeting took place when I attended the 7th International Rice Genetics Symposium (RG7) held in Manila, Philippines in November 2013. It was in this occasion that we decided to start a research collaboration.

Amount of money awarded

4,400,000 yen (JSPS)

How the matching funds were sourced from your side and how it was used

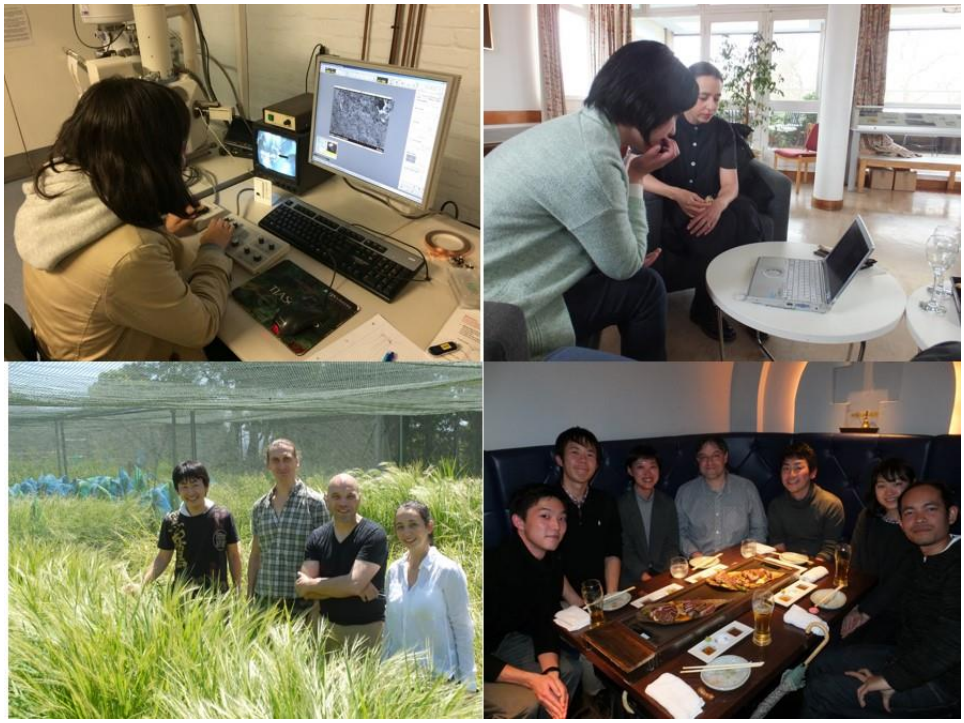
Some of the funds from the Early Rice Project were used for Ishikawa's participation in the Early Rice Symposium that took place in UCL, Institute of Archaeology in September 2015. Ishikawa presented a paper on domestication genes of rice. We also had several meeting with him and his students researching some of these domestication genes.

How participants are benefitting from the scheme

Our collaboration is providing a multidisciplinary view. It has also facilitated access to important and contemporary genetic research that is shaping our hypotheses on the domestication of rice. Likewise, Ishikawa's lab is now more closely linked to UCL and will start a collaborative project in the near future (see below).

The collaborative developments since the project started and plans for the future

A member of my laboratory, Dr. Cristina Castillo is now doing research in Ryo's laboratory in Kobe University, Japan as a Postdoctoral Fellowship supported by the JSPS. Also Dr. Ryo Ishikawa has been awarded "Promotion of Joint International Research" by JSPS and will be coming to London in order to continue research on the process of rice domestication.



Top left: Analysis of archaeological rice using scanning electron microscopy at UCL, Institute of Archaeology; Top right: Meeting conducted in the Institute of Archaeology in April 2016 to discuss domestication of rice; Bottom left. Wild rice harvesting experiment in the paddy field of Kobe University; Bottom right: Dinner with Kobe University members of staff and students in Kobe.