



## RESPONSE – Open PhD Position

### Open PhD Position in

#### RESPONSE (GA No. 847585)

«RESPONSE - to society and policy needs through plant, food and energy sciences»

H2020-MSCA-COFUND-2018

#### ESR 02

### Wheat responses in changing climates studied by Asian varieties as underexploited genetic and genomic resources

Within the European Union's Horizon 2020 research and innovation program under the Marie Skłodowska-Curie grant agreement No 847585, University of Zurich is offering a 36-month PhD position for an early-stage researchers (ESR) in in the area of sustainable food systems.

Bread wheat is one of the three major crops in the world, but its yield is projected to be reduced by rapid climate changes. To create sustainable food systems, the critical mission of breeding centers, including the International Maize and Wheat Improvement Center (CIMMYT), is breeding for anticipated climates. However, the paucity of wheat genomic information has been a major obstacle in the genetic research on bread wheat. Here, we will integrate plant genetics and genomics to study responses of wheat to climate changes. By harnessing the data of the international consortium of wheat 10+ genome project, we focus on Asian germplasm as unexplored resources for the responses to climate changes. We aim to identify loci to confer robustness against climate changes by using genome resequencing and nested association lines. The prospective student will obtain interdisciplinary training in plant genetics, field crop science and bioinformatics analyses.

**Job Description:** Recently, genomic studies of allopolyploid species are rapidly advancing owing to the development of new sequencing technologies and bioinformatics algorithms (for example, Paape et al. *Nature Communications* 9:3909, 2018; Kuo et al. *Briefings in Bioinformatics*, 10.1093/bib/bby121). These methodologies have finally allowed the assembly and analysis of the complex genomes of bread wheat, which is characterized by the extremely large genome size (about 17 Gb) and the difficulty in separating duplicated copies because of allohexaploidy. The 10+ Wheat Genomes Project, in which supervisors are responsible for the Norin 61 Japanese cultivar, has completed the *de novo* assembly of 10 world-leading varieties. A recent study reported that Asian germplasms are highly different from European ones and have a large potential in breeding, as exemplified by classic breeding materials, such as the dwarf genes *Rht-B1* and *Rht-D1* in the Japanese cultivar Norin 10, which was used for the Green Revolution at CIMMYT, the dwarf gene *Rht8* and the early-heading gene *Ppd* from the



Japanese cultivar Akakomugi, and the disease-resistance gene *Fhb1* in the Chinese cultivar Sumai 3.

We are looking for a PhD candidate, who finished (or is finishing soon) a master in plant science, bioinformatics, agriculture or relevant field. The ESR with supervisors will focus on the variations of 25 core varieties composed of landraces and old cultivars derived from East Asia (including Norin 61). First, by applying the expertise of CIMMYT, we will measure the variations of traits that are important for climate changes, such as grain yield, heading time, rust and *Septoria* resistance, and drought and heat tolerance, using the 25 varieties. The data will be analyzed with the available genome assembly of Norin 61. Second, we will map promising traits using the nested association mapping (NAM) lines that are under construction from the crossing of the 25 core varieties by the National BioResource Project-Wheat, Japan, because NAM lines combine the advantages of quantitative trait locus mapping using recombinant inbred lines with association mapping. The mapped chromosomal regions will be used for breeding in response to climate changes. A planned secondment (i.e. internship) for about 5 months at CIMMYT, Mexico, is a part of this project. During this secondment, the ESR will conduct phenotypic measurement and analysis as well as dissemination activities. To perform successfully, potential candidates should have strong interest in plant science, bioinformatics, and agriculture (preferably two of them). Good writing and communication skills are also essential.

We are offering an interesting position at the interface of science and policy. While working in an international, interdisciplinary and innovative research environment at University of Zurich, the ESR will be jointly co-supervised by Kentaro K. Shimizu (University of Zurich), Masahiro Kishii (CIMMYT, Mexico) and Shuhei Nasuda (National Bioresource Project-Wheat of Japan, Kyoto University, Japan).

For further information about the research group, a 30-minute TV program by Prof. Kentaro Shimizu and the group members is available at NHK World online (note that the English translation of some scientific details were not accurate). (<https://www3.nhk.or.jp/nhkworld/en/ondemand/video/2015220/>).

**Language requirement:** English / Proficient oral and written English skills are expected.

**Main Research Field:** plant science

**Sub Research Field:** bioinformatics

RESPONSE is open to applicants of any nationality.

The successful candidate will be matriculated and will have a working contract at University of Zurich. He/she will work in Switzerland. The secondment will take place in International Maize and Wheat Improvement Center (CIMMYT), Mexico.

The complete 36 months will be under 100% working contracts.

Expected starting date of the working contract: **01 April 2020**



For questions and further information on the position, please contact (nangsa.karutshang@ieu.uzh.ch) and see the webpage <https://www.ieu.uzh.ch/en/research/evolbiol/ecogenomics.html>, no applications.

**Benefit:** This program offers a three-year full-time position according to the PhD salary regulations of the University Zurich and according to EU regulations for Marie Skłodowska-Curie Early Stage Researchers. The gross salary will not be lower than CHF 3920.

**RESPONSE Doctoral Programme (DP):** «RESPONSE - to society and policy needs through plant, food and energy sciences» is funded by the European Union's Horizon 2020 research and innovation program under the Marie Skłodowska-Curie Grant Agreement No 847585. RESPONSE DP builds on the academic expertise of three world-leading institutions - ETH Zurich, University of Zurich and University of Basel. The successful candidate will be integrated in the research network and infrastructure of the internationally renowned competence center [Zurich-Basel Plant Science Center \(PSC\)](#).

All RESPONSE ESRs will follow the [PSC PhD Program Science and Policy](#) that is unique in its kind. Through the curriculum of this program, ESR will be trained in the communication of scientific evidence to policy-makers and the public; the involvement of different stakeholder groups as well as in policy development and endorsement in Europe and at global scale.

**Eligibility:** Early stage researcher in the first 4 years (full-time equivalent) of their research careers, including the period of research training, starting at the date of obtaining the degree which would formally entitle them to embark on a doctorate either in the country in which the degree was obtained or in the country in which the initial training activities are provided.

At the time of recruitment (for call 1 = December 1, 2019) by the host organisation, researchers must not have resided or carried out their main activity (work, studies, etc.) in Switzerland for more than 12 months in the 3 years immediately before the reference date. Compulsory national service and/or short stays such as holidays are not taken into account.

**For project, programme and application details:**

<https://www.plantsciences.uzh.ch/en/research/fellowships/response.html>

**For submitting your online application:** <https://join.lszgs.uzh.ch/> (select PhD program Science and Policy). The online application should contain all information as indicated by the application portal. Moreover, the following documents have to be uploaded under "further documents": 1) a letter of motivation to join a) the RESPONSE doctoral program and b) to apply for this specific position (ESR xx), 2) a comprehensive CV, and 3) transcripts of records. Please note that we exclusively accept applications submitted through our online application portal. Applications via email or postal services will not be considered.



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