



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 26

Genomic Selection 2.0: Developing Targeted vs Universal Machine Learning Approaches for Improving the Rate of Genetic Gain in Crop Species

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

Job Description

Genomic selection (GS) is a powerful method to increase the selection efficiency and genetic gain in crop breeding. New machine and deep learning approaches are set to revolutionise the data input structure for GS model development as well as the resulting prediction accuracy. We are looking for applicants to a doctorate position on "Genomic Selection 2.0: Developing Targeted vs Universal Machine Learning Approaches for Improving the Rate of Genetic Gain in Crop Species".

The doctoral candidate will be investigating the power of GS in multiple crops and drive the discovery of trends, statistical models, and machine learning algorithms and their implementation in a plant breeding setting. The species proposed in this study from Puregene and the Molecular Plant Breeding group of ETH Zurich are apple (*Malus domestica* L. Borkh), common bean (*Phaseolus vulgaris* L), perennial ryegrass (*Lolium perenne* L.), buckwheat (*Fagopyrum esculentum* Moench), wheat (*Triticum aestivum* L.), and flower as well as hemp type cannabis (*Cannabis sativa* L). During the project, the ESR will

- (i) Develop different statistical models for multiple species with given datasets, which will provide in-depth knowledge on the requirements for datasets to maximize prediction accuracy and how different models work for different data structures
- (ii) Establish machine learning approaches and compare them to linear models
- (iii) Improve existing datasets using high resolution phenotyping, genome phasing or targeted resequencing of specific genome regions

A planned secondment of nine months at Puregene (<https://puregene.pureholding.ch/>) in Zeiningen, Switzerland is part of this project. Under the supervision of Maximilian Vogt, head of Plant Breeding at Puregene AG, the ESR will be involved in collecting phenotypic (field and



glasshouse) and genotypic data. The successful candidate is expected to produce quality research to be published in open-access, peer-reviewed journals relevant to the field, as well as communication within the network of Puregene.

Interested / Your profile

To perform successfully, potential candidates should have:

- A master's degree in Computational Biology or Plant Sciences/Plant Breeding with a strong background in Computational Biology
- Experience in using genomic technologies to analyse and model complex traits
- Knowledge on multi-variate genomic prediction for crop breeding, ideally combined with the ability to develop software and run software packages appropriate for analysis of large data sets including multiple layers of genomic, phenotypic and environmental data
- Skills to apply genetic and phenotypic data simulation methodology to evaluate prediction accuracies of models and complement empirical statistical analysis methodology
- Thrive to establish effective relationships and to represent and promote the research in industry and academia

The candidate of choice is:

- An enthusiastic, problem solving person who likes working in a multidisciplinary team
- A team player that can also work independently

Eligibility: Early stage researcher in the first four 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 4 = July 1, 2021) 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.

Language requirement: Proficient oral and written English skills are expected. Knowledge of German is a plus.

Main Research Field: Molecular Breeding, Genomic Selection



Sub Research Field: Plant Genetic Resources, Genomics, Statistical Modelling, Linear Models, Mixed Models, Machine Learning, Deep Learning (Neural Networks), Genetic Gain, Plant Breeding

RESPONSE is open to applicants of any nationality.

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) one letter of motivation to join a) the RESPONSE Doctoral Programme and b) to apply for the specific position (ESR 26) or multiple positions, 2) a comprehensive tabular CV, and 3) transcripts of records. If you apply for more than one RESPONSE position, please refer to them in your letter of motivation. Please note that we exclusively accept applications submitted through our online application portal. Applications via email or postal services will not be considered. The deadline is July 1, 2021.

Benefit

We are offering an interesting position at the interface of science and policy. While working in an international, interdisciplinary and innovative research environment at ETH Zurich, the ESR will be jointly co-supervised by the group Molecular Plant Breeding at ETH Zurich and Puregene AG.

The complete 36 months will be under a 100% working contract.

The PhD salary follows the regulations of ETH Zurich and will be according to EU regulations for Marie Skłodowska-Curie Early Stage Researchers. The monthly gross salary will not be lower than CHF 3920.

The successful candidate will be matriculated and will have a working contract at ETH Zurich. The candidate will work in Switzerland. The secondment will take place in Zeiningen, Switzerland.

Expected starting date of the working contract: **01.10.2021**

For questions and further information on the position, please contact (Prof. Dr. Bruno Studer, bruno.studer@usys.ethz.ch or Maximilian Vogt, vogt@pureeurope.eu), no applications.

Further information

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](#).

All RESPONSE ESRs will follow the [PSC PhD Program Science and Policy](#) that is unique in its kind. Through the curriculum of this program, ESRs 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.

For project, programme and application details:

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

Working location:

Molecular Plant Breeding

Universitätstrasse 2

8092 Zurich

Switzerland

Puregene

Etmatt 273

4314 Zeiningen

Switzerland



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