

A Postdoctoral Position Available at ETH Zurich Between the Plant Pathology and Crop Science Groups in the Institutes of Integrative Biology and Agricultural Sciences

**Phenomics of Plant Disease**

We seek applicants with expertise in plant pathology, plant phenotyping, image analysis, machine learning, or proximal sensing, to lead a research group oriented around next generation phenotyping of plant diseases in both field and greenhouse settings. Applicants should be able to work independently and to publish their research in excellent peer-reviewed journals. Applicants should have effective communication skills, both oral and written, and be able to lead and coordinate a research team of 2-3 people. A good publication record is essential.

Applicants should possess demonstrated experience in research topics related to plant phenomics, including expertise in one or more of the following areas: plant pathology, automated image analysis, machine learning, spectral vegetation indices, proximal or remote sensing of vegetation. Experience with plant pathogens is desirable, though not required, but applicants who already have experience with plant pathogens will have an advantage. Experience with statistics and programming is expected. The ability to manage and analyze extensive phenotype datasets containing millions of data points is essential. The successful applicant will be granted a high degree of flexibility in research direction and approach. The position is renewable annually for up to five years. Female scientists are especially encouraged to apply.

Major areas of research in the Plant Pathology Group are population genomics and evolutionary ecology of fungal pathogens. A primary experimental organism is *Zymoseptoria tritici* (aka *Mycosphaerella graminicola*) which causes septoria tritici blotch (STB), the most damaging wheat disease in Europe. We have already developed and implemented high throughput phenotyping methods oriented around automated image analysis to acquire millions of phenotype data points for a variety of important traits in *Z. tritici*, including quantitative virulence, reproduction, fungicide sensitivity, and growth at different temperatures and under different stresses (some representative references below). We now aim to extend these methods to perform under field conditions to accelerate progress in breeding for STB resistance.

Research of the Crop Science Group focuses on the development and application of image-based phenotyping technologies. We have developed a unique field phenotyping platform (FIP) that is operated on our field site in Eschikon, 20 km outside of Zürich. There and at other field sites, we are engaged in experiments related to crop breeding, smart farming and precision agriculture. Most of our work is currently related to wheat. Imaging is done from the multi-sensor head of the FIP but also from drones and it encompasses sensors such as DSLR-cameras, thermal, multispectral and laser scanning devices (some representative references below). Data evaluation is partly performed with commercial solutions and partly with custom-made software.

The ETH and the Institute of Integrative Biology possess advanced infrastructure including the Genetic Diversity Center (<http://www.gdc.ethz.ch/>) and the Functional

Genomics Center Zurich (<http://www.fgcz.ethz.ch/>). Zurich is consistently rated as one of the most livable cities in the world. The Plant Pathology Group (<http://www.path.ethz.ch/>) is currently composed of ~20 people from 11 countries, and English is the working language of the group. But knowledge of German or French is useful outside of the university. The Crop Science Group currently consists of ~15 people mostly from Switzerland. Working languages are German and English.

Applications consisting of a CV, publication list and a detailed statement of research interests, with names and contact information for 3 references should be prepared as a single pdf file and sent by email before 1 June 2020 to Prof. Bruce A. McDonald at [bruce.mcdonald@usys.ethz.ch](mailto:bruce.mcdonald@usys.ethz.ch). Applications will be processed as they are received, so it is possible that the position will be offered to an excellent candidate before 1 June 2020. The position can be filled beginning 1 June 2020 but will remain open until a suitable scientist is found.

#### References:

Yates, S., Mikaberidze, A., Krattinger, S.G., Abrouk, M., Hund, A., Yu, K., Studer, B., Fouche, S., Meile, L., Pereira, D., Karisto, P., McDonald, B.A. 2019. Precision phenotyping reveals novel loci for quantitative resistance to septoria tritici blotch. *Plant Phenomics* Article ID 3285904, 11 pages. DOI: 10.34133/2019/3285904.

Karisto, P., Walter, A., Hund, A., Yu, K., Anderegg, J., Mascher, F., McDonald, B.A., Mikaberidze, A. 2018. Ranking quantitative resistance to septoria tritici blotch in elite wheat cultivars using automated image analysis. *Phytopathology* 108:568-581. DOI: 10.1094/PHYTO-04-17-0163-R.

Roth L, Aasen H, Walter A, Liebis F. 2018. Extracting leaf area index using viewing geometry effects—a new perspective on high-resolution unmanned aerial system photography. *ISPRS Journal of Photogrammetry and Remote Sensing* 141, 161-175.

Kirchgessner N, Liebis F, Yu K, Pfeifer J, Friedli M, Hund A, Walter A. 2017. The ETH Field Phenotyping Platform FIP - A Cable-Suspended Multi-Sensor System. *Functional Plant Biology* 44, 154-168.