

Opportunity Title: USDA-ARS Postdoctoral Fellowship: Temporal Control of Immunity in Barley

Opportunity Reference Code: USDA-ARS-2022-0246

Organization U.S. Department of Agriculture (USDA)

Reference Code USDA-ARS-2022-0246

How to Apply **Connect with ORISE...on the GO!** Download the new ORISE GO mobile app in the Apple or Google Play Store to help you stay engaged, connected, and informed during your ORISE experience and beyond!

A complete application consists of:

- An application
- Transcript(s) – For this opportunity, an unofficial transcript or copy of the student academic records printed by the applicant or by academic advisors from internal institution systems may be submitted. All transcripts must be in English or include an official English translation. Click [here](#) for detailed information about acceptable transcripts.
- A current resume/CV, including academic history, employment history, relevant experiences, and publication list
- Two educational or professional recommendations

All documents must be in English or include an official English translation.

Application Deadline 8/10/2022 3:00:00 PM Eastern Time Zone

Description ***Applications will be reviewed on a rolling-basis.**

ARS Office/Lab and Location: A research opportunity is available with the U.S. Department of Agriculture Agricultural Research Service (ARS) at the Corn Insects and Crop Genetics Research Unit located on the Iowa State University campus in Ames, Iowa.

The Agricultural Research Service (ARS) is the U.S. Department of Agriculture's chief scientific in-house research agency with a mission to find solutions to agricultural problems that affect Americans every day from field to table. ARS will deliver cutting-edge, scientific tools and innovative solutions for American farmers, producers, industry, and communities to support the nourishment and well-being of all people; sustain our nation's agroecosystems and natural resources; and ensure the economic competitiveness and excellence of our agriculture. The vision of the agency is to provide global leadership in agricultural discoveries through scientific excellence.

Research Project: Plant pathogens are among the greatest threats to crop production worldwide, resulting in yield losses of 10-20% each year. Obligate biotrophic fungi (e.g., mildews and rusts) require a living host to survive and cause some of the most destructive epidemics. Because they are unable to survive autonomously, obligate parasites also represent ideal tools for exploring interdependent signaling between disease agents and their hosts.

The participant will use both computational and functional approaches to investigate the temporal control of immunity to obligate fungal pathogens. There are two broad objectives: 1) Develop an integrated network of barley-powdery mildew interactions as a framework to dissect immune signaling in



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cereals, and 2) identify barley regulatory elements associated with immunity to exploit in modern breeding programs.

The interaction between the cereal grain crop barley (*Hordeum vulgare* L.), and the powdery mildew fungus, *Blumeria graminis* f. sp. *hordei*, is the system by which this challenge will be addressed. As a model for the large-genome Triticeae (barley, wheat, and rye), the candidate will focus on the barley MLA immune receptor, a conserved ancestral protein for immunity, as a trigger to discover novel mechanisms for cereal disease defense.

The candidate selected for this opportunity will have access to a variety of approaches and data sets, such as large-scale RNA-sequencing of immune compromised mutants, yeast-two-hybrid next-generation-interaction screens, analysis of chromatin immunoprecipitation sequencing (ChIP-seq), and assay for transposase-accessible chromatin with sequencing (ATAC-Seq) to determine chromatin accessibility across the genome. They will evaluate published literature, connect immune-active cis-regulatory elements from barley to their cognate transcription factors, and research methodologies to establish a gene regulatory network of barley in response to the powdery mildew pathogen.

Learning Objectives: The participant will learn advanced bioinformatic & computational pipeline development, troubleshooting, and end-use applications. This will be a valuable learning experience for the research scholar -- The computational and functional approaches will be instrumental in understanding how crop cellular networks respond to and are re-wired by pathogens, as it is unknown how current results from model species translate to Triticeae grain crops. To maximize public access for cereal scientists and breeders, project data sets will be archived in the appropriate public databases.

To provide opportunities for professional development, candidates are encouraged to publish their results in peer-reviewed scientific journals and present their research findings at scientific meeting and conferences. Interactions and knowledge transfer with bench scientists, as well as bioinformatics/computational biologists from around the world, will enable the candidate to prosper in a diverse and global STEM workforce.

Learning objectives comprise gaining skills in multi-omics experimental design, diverse computer programming languages, pipeline development, and statistical analysis. These goals may include, but are not limited to, large-scale RNA-sequencing, yeast-two-hybrid next-generation-interaction screening, analysis of chromatin immunoprecipitation sequencing (ChIP-seq), assay for transposase-accessible chromatin with sequencing (ATAC-Seq), and functional approaches such as co-immunoprecipitation or virus-induced gene silencing. This will enable the creation of a multi-dimensional gene regulatory network and experience in experimental validation of the prediction models.

Mentor(s): The mentor for this opportunity is Roger Wise (roger.wise@usda.gov). If you have questions about the nature of the research please contact the mentor(s).

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Anticipated Appointment Start Date: **August 9, 2022.** Start date is flexible and will depend on a variety of factors.

Appointment Length: The appointment will initially be for two years, but may be renewed an additional year upon recommendation of ARS and is contingent on the availability of funds.

Level of Participation: The appointment is part-time (20 hours a week).

Participant Stipend: The participant will receive a monthly stipend commensurate with educational level and experience.

Citizenship Requirements: This opportunity is available to U.S. citizens, Lawful Permanent Residents (LPR), and foreign nationals. Non-U.S. citizen applicants should refer to the [Guidelines for Non-U.S. Citizens Details page](#) of the program website for information about the valid immigration statuses that are acceptable for program participation.


ORISE Information: This program, administered by ORAU through its contract with the U.S. Department of Energy (DOE) to manage the Oak Ridge Institute for Science and Education (ORISE), was established through an interagency agreement between DOE and ARS. Participants do not become employees of USDA, ARS, DOE or the program administrator, and there are no employment-related benefits. Proof of health insurance is required for participation in this program. Health insurance can be obtained through ORISE.

Questions: Please visit our [Program Website](#). After reading, if you have additional questions about the application process please email USDA-ARS@orau.org and include the reference code for this opportunity.

Qualifications The qualified candidate should have received a doctoral degree in one of the relevant fields (e.g. Bioinformatics, Computational Biology). Degree must have been received within the past two years.

Preferred Skills:

- Advancing training in statistics
- Ability to read and evaluate scientific literature
- Experience in advanced computer programming and molecular biology methods
- Training or experience in barley-powdery mildew interactions
- Ability to develop mathematical and/or molecular models from genomic data sets

- Eligibility Requirements**
- **Degree:** Doctoral Degree received within the last 24 month(s).
 - **Discipline(s):**
 - **Life Health and Medical Sciences** ([6](#) )