**Opportunity Title:** USDA-ARS Soil Organic Carbon Research Fellowship
**Opportunity Reference Code:** USDA-ARS-CERCA-2026-0147

**Organization** U.S. Department of Agriculture (USDA)

**Reference Code** USDA-ARS-CERCA-2026-0147

**How to Apply** ***To submit your application, scroll to the bottom of this opportunity and click APPLY.***

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.
  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
- A copy of an abstract or reprint of an article

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

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**Application Deadline** 6/5/2026 3:00:00 PM Eastern Time Zone

**Description** ***Applications are reviewed on a rolling-basis.**

**ARS Office/Lab and Location:** A research opportunity is currently available with the U.S. Department of Agriculture (USDA), Agricultural Research Service (ARS), located in West Lafayette, Indiana.

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:** This project advances soil health assessment by quantifying and characterizing soil organic carbon using integrated field measurements and advanced molecular analytical techniques, including pyrolysis gas chromatography mass spectrometry and complementary chromatographic methods. The research evaluates how agricultural management practices influence soil organic carbon quantity, composition, and stability across managed agroecosystems, with direct implications for long term agricultural productivity and system performance.

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A central objective is the molecular level characterization of soil organic matter to improve mechanistic understanding of carbon cycling and stabilization processes within production systems. Pyrolysis gas chromatography mass spectrometry and related chromatographic approaches are applied to identify and quantify compound classes derived from plant inputs, microbial residues, and processed organic matter fractions. These analyses provide detailed information on the chemical composition and transformation pathways of soil organic carbon, enabling differentiation between labile and persistent carbon pools beyond conventional bulk measurements.

The project evaluates the effects of conservation and management practices, including reduced tillage, cover cropping, and diversified crop rotations, on soil organic carbon sequestration, persistence, and functional stability. By integrating molecular scale data with field measurements, the research determines how these practices influence both total carbon stocks and the chemical composition of organic matter. This approach improves understanding of how management drives soil function, supports nutrient availability, and enhances crop performance, yield stability, and resilience under variable environmental conditions.

Standardized workflows include soil sampling, laboratory preparation, and chromatographic analysis, followed by data integration to link molecular signatures with ecological processes such as decomposition, carbon stabilization, and nutrient cycling. Resulting datasets are used to refine soil health indicators that are sensitive to management driven changes in soil organic carbon dynamics and to improve predictive capability across soil types, climates, and production systems.

The project further connects soil organic carbon dynamics with broader agroecosystem outcomes, including soil structure, water retention, nutrient availability, and system resilience. Improvements in soil organic carbon quantity and quality are directly associated with increased resource use efficiency, reduced input losses, and improved soil physical properties that support root development and water availability. These changes contribute to sustained or increased yields, improved profitability, and reduced production risk under both favorable and stress conditions. By applying advanced analytical techniques within a systems framework, this supports science based management strategies that improve soil health, strengthen farm productivity, and promote resilient and sustainable agricultural systems.

**Learning Objectives:** Under the guidance of the mentor, the participant will learn how to:

- Develop advanced knowledge of soil organic carbon dynamics and their role in soil health, agricultural productivity, and agroecosystem resilience.
- Interpret molecular signatures to distinguish between labile and persistent carbon pools and to explain mechanisms of carbon cycling

and stabilization.
- Strengthen the ability to evaluate how management practices such as reduced tillage, cover cropping, and diversified crop rotations influence soil organic carbon quantity, composition, and stability.
- Build competency in integrating field measurements with laboratory-based molecular data to assess soil function, nutrient dynamics, and system performance.
- Enhance skills in translating soil organic carbon data into practical, science-based recommendations that support resilient, productive, and sustainable agricultural systems.

They will also gain hands-on expertise in molecular characterization of soil organic matter using pyrolysis gas chromatography mass spectrometry and complementary chromatographic techniques.

**Mentor(s):** The mentor for this opportunity is Javier Gonzalez (javier.gonzalez@usda.gov). If you have questions about the nature of the research, please contact the mentor(s).

**Anticipated Appointment Start Date: April 2026.** Start date is flexible and will depend on a variety of factors.

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

**Level of Participation:** The appointment is full time.

**Participant Stipend:** The participant will receive a monthly stipend commensurate with educational level and experience. **The anticipated stipend range is $73,000 - $76,000 annually.**

**Citizenship Requirements:** This opportunity is available to U.S. citizens only.

**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 ORISE.ARS.CERCA@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. Degree must have been received within the past year.

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**Preferred skills:**

- A plus if the candidate knows/familiar with software related to the instruments (GC Solutions, AMDIS, and Frontier pyrolysis) and chemical techniques such as TMAH thermochemolysis

**Stipend** $73,000.00 – $76,000.00 Yearly

**Point of Contact** Janeen

**Eligibility Requirements**

- **Citizenship:** U.S. Citizen Only
- **Degree:** Doctoral Degree received within the last 12 month(s).
- **Discipline(s):**
  - **Chemistry and Materials Sciences** (1)
  - **Earth and Geosciences** (1)
  - **Environmental and Marine Sciences** (1)
  - **Life Health and Medical Sciences** (2)