Opportunity Title: Postdoctoral Research Opportunity in Uses of Byproducts from Agricultural Waste Streams
Opportunity Reference Code: USDA-ARS-2019-0134

Organization U.S. Department of Agriculture (USDA)

Reference Code USDA-ARS-2019-0134

How to 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. 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.

If you have questions, send an email to USDA-ARS@orau.org. Please include the reference code for this opportunity in your email.

Application Deadline 9/30/2019 3:00:00 PM Eastern Time Zone

Description A research opportunity is currently available with the U.S. Department of Agriculture (USDA), Agricultural Research Service (ARS), Coastal Plains Soil, Water and Plant Research Center located in Florence, South Carolina. Additional research analysis will be conducted at the U.S. Environmental Protection Agency (EPA), National Health and Environmental Effects Research Laboratory (NHEERL) located in Corvallis, Oregon.

The Co-mentors for this opportunity are Drs. Jeff Novak and Mark G. Johnson. Both are Research Soil Scientists with their agencies. Dr. Novak has a research program geared to develop beneficial uses of agricultural byproducts from agricultural waste streams. Dr. Johnson also has part of his research program to use byproducts for the environmental restoration of mine-impacted sites and wetlands.

Phosphorus (P) imbalances occur in soils and watersheds of the Delmarva area because of concentrated animal production and over-application of manure. There is a risk of water quality impairment in the Delmarva area because more P is generated than regional soils can assimilate. These agronomic and environmental issues stress the need to devise alternate animal manure management strategies resulting in products that can be either transported out of animal-dense watersheds or used for bioenergy production. One alternate manure management program available is to pyrolyze animal manure to produce bioenergy and a residual byproduct called biochar. Biochars can be effective soil fertility amendments and serve as P and metals (i.e., copper, zinc, etc.) sorbents in waste effluent streams and storm water runoff.

The goals of this research opportunity are to develop/refine methods to activate biochars and evaluate their ability to increase P and metal sequestration in heavily manured soils and waste effluent streams. Additionally, P sequestered by activated biochars will be evaluated in green house trials to determine their ability to serve as a P fertilizer for crops/plants. Under the guidance of Dr. Novak, the participant will travel to the Delmarva area to collect soils and poultry litter feedstocks. At the Florence location, the participant will use these feedstocks to create new/refine existing methods to activate biochars after mixing with materials from municipal (water treatment residuals), environmental (acid mine drainage solids), and chemical (magnesium, Fe-oxides) production sectors. The participant will evaluate the P binding capabilities of these activated

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biochars using standard sorption/desorption isotherms, and through greenhouse/soil extractions and microcosm experiments determine their ability to serve as a P source (fertilizer) or a P scavenger (reduce P concentrations). Additionally, laboratory experiments will be devised by the participant to evaluate activated biochars ability to sequester copper and zinc in heavily manured/mine-impacted soils. Under the mentorship of Dr. Johnson, the participant will travel to Corvallis and partake in spectroscopic characterization of the activated biochar surfaces to determine P and metal binding mechanisms.

Anticipated Appointment Start Date: November 18, 2019

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. The initial appointment is for one year, but may be renewed upon recommendation of ARS and is contingent on the availability of funds. The participant will receive a monthly stipend of $5,186. No relocation allowance will be provided. Proof of health insurance is required for participation in this program. The appointment is full-time at ARS in the Florence, South Carolina, area. Participants do not become employees of USDA, ARS, DOE or the program administrator, and there are no employment-related benefits.

This opportunity is available to U.S. citizens only.

For more information about the ARS Research Participation Program, please visit the **Program Website**.

Qualifications

The qualified candidate should have received a doctoral degree in one of the relevant fields, or be currently pursuing the degree and will reach completion by November 18, 2019.

Preferred skills/experience:

- Ability to travel and participate in field soil sampling and poultry litter feedstock collection in the Delmarva area
- Analytical skills to prepare solutions and chemicals for activating feedstocks for biochar production
- Experience to conduct and interpret laboratory P and metal sorption/desorption experiments
- Ability to set up and conduct a greenhouse experiment involving plants/crops
- Basic understanding of spectroscopic techniques for biochar surface chemical analysis and knowledge for spectral result interpretation
- Knowledge of basic soil fertility/chemistry principals and understanding of plant nutritional requirements
- Experience to compose and publish manuscripts in peer-reviewed scientific journals and make presentations at meetings
- Ability to conduct research in professional settings with other scientists

Eligibility Requirements

- **Citizenship:** U.S. Citizen Only
- **Degree:** Doctoral Degree.
- **Discipline(s):**
  - **Chemistry and Materials Sciences** (5 👁)
  - **Communications and Graphics Design** (1 👁)
  - **Computer, Information, and Data Sciences** (2 👁)
  - **Earth and Geosciences** (2 👁)
  - **Engineering** (3 👁)

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- **Environmental and Marine Sciences** (3 👁)
- **Life Health and Medical Sciences** (3 👁)
- **Mathematics and Statistics** (2 👁)
- **Physics** (1 👁)

Affirmation I have received a doctoral degree or am currently pursuing the degree and will reach completion by November 18, 2019.