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United States Department of Agriculture
Project Initiation

Project Data for Accession Number 1033502

Project Title

Basaltic Rock Dust (Bard) Amendment For Improved Soil Health

Project Details

Sponsoring Institution National Institute of Food and Agriculture	**Project Status** ACTIVE
Funding Source NIFA Non Formula	**Grant Year** 2026
Grant No. 2025-67019-44443	**Cumulative Award Amt.** $749,999.00
Proposal No. 2024-10794	**Multistate No.** (N/A)
Project Start Date Dec 15, 2025	**Project End Date** Dec 14, 2029
Program Code [A1401] Foundational Program: Soil Health	

Project Director

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Recipient Organization

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Performing Department

(N/A)

Non Technical Summary

The agronomic benefits of basaltic (volcanic) rock dust (BARD) used as a soil amendment to significantly improve soil health will be evaluated across two unique subtropical agroecosystems in Florida: (i) row crop production on Histosols within the Everglades Agricultural Area (EAA); and (ii) cultivated perennial pastures associated with an established USDA Long-Term Agroecosystem Research (LTAR) site. Sandy and organic soils in Florida present unique opportunities to evaluate BARD as a potential soil amendment because of inherent limitations of these soil types to intensive agricultural practices. The project will focus on the agronomic benefits of enhanced rock weathering of silicates, in this case basaltic volcanic rocks, to evaluate the viability for widespread application in the soil types of regions in North America where weathering rates are fastest. The research fits directly into aspects of three Soil Health Priority Areas presented in the USDA-NIFA request for proposals: (i) the foundational research will be directly translatable for applied research on soil sustainability and agronomics, (ii) the research will evaluate new management

practices in Histosols and sandy soils in the subtropics with significant environmental health benefits, and (iii) the practices evaluated in this research will improve soil health and promote more resilient and sustainable agricultural systems.

Animal Health Component

Animal Health Component: 0%

Research Effort Categories

Basic	30%
Applied	70%
Developmental	0%

Classification

Knowledge Area (KA)	Subject of Investigation (SOI)	Field of Science (FOS)	Percent
102	0110	2030	100%

Knowledge Area

[102] Soil, Plant, Water, Nutrient Relationships

Subject Of Investigation

[0110] Soil

Field Of Science

[2030] Geology

Keywords

Histosols; pastures, soil health; basaltic ash; volcanic material

Goals / Objectives

This project will take a conservationagricultural practice approach to improve soil quality and achieve food security by the use of soil amendmentsin key subtropical agroecosystems. The agronomic and environmental benefits of basaltic (volcanic) rock dust (BARD) used as a soil amendment to significantly improve soil health will be evaluated across two unique subtropical agroecosystems in Florida: (i) row crop production on Histosols within the Everglades Agricultural Area (EAA); and (ii) cultivated perennial pastures associated with an established USDA Long-Term Agroecosystem Research (LTAR) site. Sandy and organic soils in Florida present unique opportunities to evaluate BARD as a potential soil amendment because of inherent limitations of these soil types to intensive agricultural practices. Additionally, the potential of enhanced rock weathering of silicate rockwill be realized when the agricultural benefits are tested and economically viable in the soil types of regionswhere weathering rates are fastest. The research fits directly into aspects of three Soil Health Priority Areas presented in the USDA-NIFA request for proposals: (i) the foundational research will be directly translatable for applied research on soil sustainability and agronomics, (ii) the research will evaluate new management practices in Histosols and sandy soils in the subtropics with significant

environmental health benefits, and (iii) the practices evaluated in this research will improve soil health and promote more resilient and sustainable agricultural systems.

Project Methods

(A).Sample raw material will be obtained from the following quarries and additional quarries/suppliers as available during year one: Sunrock, NC: Stavola, NJ; SGI, PA; Tilcon, NY; Knife River, OR; Miller Mining, AZ; and Cinderlite, NV. Most of these locations are in the eastern US to reduce shipping distances. The raw material from western sources will be evaluated for comparison and additional characteristics.We will obtain crushed and milled rock at the finest grain sizes available or byproduct fines from other aggregate production from the quarries. Hard rock and cinder samples will also be obtained for laboratory crushing and milling experiments to be performed in the Department of Geological Sciences at UF. Preparation for grain size experiments and analytical analyses listed below will be done with a jaw crusher, disc mill, cross beater mill, and ring mill as needed to achieve different ranges of particle sizes including uniform micro-scale single grains. Particle sizes and surface area will be determined using standard gravimetric sieves and a laser particle size analyzer.Analyses of BARD chemistry and mineralogy will include:Major and trace element geochemistry-XRF, solution total digestion ICP-MS, total digestion MC-ICP-MS.Mineralogy - polarized optical microscopy, XRD, SEM, LA-ICP-MS.Fertilizer equivalent testing for extractable nutrients using standard EPA methods to be done at UF/IFAS laboratories. Specifically, each BARD product will be analyzed for total and extractable (Mehlich-3, and water) P, K, Ca, Mg, Cu, Fe, Al, Zn, Mn, B, Si, S, and Total Kjeldahl N.Carbon stability - The stability of C pool will be evaluated by analyzing soils for Total C (TC) and active C (AC). Relative to concentration, a high TC/AC ratio would be indicative for greater C stability and lower leaching potential.Physical property of the BARD and a range of BARD plus soil mixtures including permeability, porosity, compressibility, and bulk density.(B).The study will be conducted in years 2, 3, and 4 on an established 'Pensacola' bahiagrass perennial pasture. The predominant soil type is Smyrna sand (sandy, siliceous, hyperthermic Aeric Alaquods), which has a texture of 890 g kg-1 of sand, and 45 g kg-1 of clay, pH of 5, and total C and N concentrations of 28 and 1.7 g kg-1, respectively. As described in Task 2a, information from Task 1 will be used to select the BARD materials that will be evaluated in the field. Treatments will consist of 3 BARD materials applied at 2 rates (high 8 t/ha (~3.5 t/ac), low 2 t/ha (~0.9 t/ac) plus 1 control (no BARD) treatments (e.g., Korchagin et al., 2022). All treatments will be replicated three times for a total of 21 plots.Each plot will be 4 m x 5 m with a 2 m isle between plots. Response variables will include: Forage production, mineral composition, and nutritive value for livestock- Forage evaluations will be conducted twice a year to evaluate the effects of BARD treatments on forage production and nutritive value. Soil soil health responses- Soil samples (0-10, 10-20, 20-40, 40-60, and 60-100 cm) will be collected in year-2 (pre-BARD application) and year-4 (twenty-four months after application). Samples will be analyzed following the same procedure described in Task 2a. ?