Diana Rodríguez Pérez
RET Site 2019

Module Title - Soil: The Great Integrator

Laboratory research summary:

Wildfires in Puerto Rico are becoming alarmingly common, especially in the southern and western drier parts of the island with a dry season from January to April. These wildfires have become a significant problem not only in natural ecosystems but in abandoned and active farmlands as well. Many of these areas are dominated by invasive species that might produce greater amount of fuel loads than native vegetation. Soil erosion can be increased after burning because of loss of ground cover (e.g. plant litter), vegetation, increased runoff, fire induced-soil water repellency and reduced water infiltration. Currently, there is a need in Puerto Rico to develop management strategies to reduce soil erosion after wildfires. The main objective of this research was to test soil surfactant and mulch as management practice to reduce soil erosion after a fire event.

Summary of your research during the summer:

During the summer experience I collaborated in the search of study sites to test soil erosion after fire events in multiple locations within the drier Southern part of Puerto Rico using a rain simulator. At each location selected the next step will be the implementation of the protocol designed for the study that include four treatments, these are: positive control (burned, without post-fire management), negative control (not-burned), surfactant (burned, surfactant application), and mulch (burned, mulch application). I also collected and prepared soil samples to determine the texture, pH, aggregate stability and a calibration curve for amending acid soils.

Summary of your activity (module):

- Explain the importance of soil as non-renewable resource.
- Determine soil texture of different samples.
- Determine aggregate stability.
- Measure soil pH and prepare a calibration curve for the amending of acidic soils.
- Make a Rainfall Simulator to evaluate the erosion on different soil conditions
- Analyze the visible light absorbance spectrum of soil samples to appreciate the variety in color of soil according its composition.
- Make crayons and aquarelles using soil of different colors.
- Cultural artistic expressions using soil:
    - Taínos Symbols: Using Taínos symbols (petroglyphs) around the classroom promotes literacy and the diversity of language throughout the world and in time. Keep in mind that because of the history of colonialization, much of what we know about the meanings of Taínos symbols is up to interpretation. Discuss the symbols then do the link to the colors of soil. Explain that the pigments of the soil were used by Taínos for art and body paint in the rituals and ceremonies.

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Who was your mentor?

Advisor: Mario Flores, PhD
Research Mentor: Lyvette Trabal, Research Assistant

What your students did in the classroom activity during the school year?

All the activities detailed on module and a lab report. Artistic expressions using crayons and aquarelles made of soil were exhibited.

Students picture working during the activities.

Soil Research Project won 1st prize in Regional Science Fair. Student: Shante Pérez Nieto

How many students participated from the activity?

Females = 29 Males = 19

How many times you offered the activity in the classroom?

We were working the activities of the module during February 17- 28, 2020. The module was offered to two courses, divided into two sections of Chemistry and one section of Research. Time frame was six days each section (3 days per week).

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How evaluated the activities:

The activities covered multidisciplinary concepts integrated in the topic of soil. The students were excited about activities and they said that it helped them to understand the concepts related, enjoy applications in art, and improved lab skills. It was a science with fun.

Additional information from your school:

School	Demographic Information
CROEM School - Mayagüez, Puerto Rico	• Total: 247 students • Non-Hispanic: 1.2% • Hispanic: 98.8% • Poverty Level: 32%