

Long-term Observation of the Restored Prairie Soil Microbiome

As threatened ecosystems, prairie habitats are in need of restoration, and it is vital during the restoration process that all facets, including the effects on the health of the soil and its microbiome, of such projects be evaluated. Prairie soil health is largely dependent on the microbial communities that comprise it as well as the chemical nutrients that are cycled within. Nachusa Grasslands presents an ideal study site, as it is a prairie restoration site that includes remnant prairie as well as a chronosequence of restored prairies. The project I have the opportunity to work on explores the biotic and abiotic activity of the soil at Nachusa Grasslands in an effort to provide data that can better inform prairie restoration management as to the specific outcomes of their restoration practices.

The process of analyzing microbial community structure and soil geochemical content first begins with soil sampling, which is done once per Spring, Summer, and Fall season each year for each of the eighteen plots we are studying at Nachusa (see Figure 1). The soil is immediately frozen and stored at -80°C until it is ready for further processing. With the funding received from the Student Engagement Fund Award, a DNA extraction kit was purchased (see Table 1) and I was able to extract DNA from each of the fifty four 2019 samples (18 per season). I then amplified the extracted DNA via PCR and viewed the preliminary results of amplification by running the DNA through gel electrophoresis (see Figure 2). As next steps for our research, the PCR products will be shipped to a DNA Services Lab at University of Illinois at Chicago where the DNA will be sequenced. Once sequencing data results are received, likely early in the Spring 2020 semester, we will begin data analysis. This analysis will help us to see patterns of changes in microbial community structure as a result of prairie restoration, bison introduction, and prescribed prairie burns. We will also be analyzing the carbon and nitrogen concentration of

the soil samples in order to gain a better understanding of nutrient cycling within the ecosystem and the role that soil microbes play in that process.

In reflecting on how well I was able to accomplish my goals for this semester, I am proud to say that I was, indeed, able to complete all of the tasks I set out to do. Additionally, I was able to complete these objectives in such a way as to have set up the work I will be doing next semester in an organized fashion so that I can continue where I've left off. One such way this is being done is through the utilization of the winter break time as the time that are waiting for DNA sequencing results to be completed by the DNA Services Lab at UIC, rather than waiting for the work to be done during the semester. I am excited to return in January knowing that I have completed all that I set out to do during the fall semester.

Having an opportunity to be included in the SEF program gave me the gift of time, thereby increasing the quality of my work on this research project. As a single, working mother of two who is enrolled as a full time student, I was able to cut back on the hours I would normally spend working at my job and dedicate those hours to working in the lab for larger windows of time, making the experience much more enjoyable. I was also able to spend more time outside of the lab doing data analysis on DNA sequencing from samples taken at Nachusa in past years and reading the research of other scientists in this field in order to gain insight into my own present and future work. Receiving the SEF award has allowed me to invest in my future as a microbiologist in ways that I may not have been able to do otherwise, and for that I cannot say enough how much I appreciate the SEF program.

SEF Reimbursement Funds	Item Purchased
\$500	DNA Extraction Kit

Table 1 Budget Details for SEF Funds Received



Figure 1 Nachusa Soil Samples Collected for Summer 2019



Figure 2 Gel Electrophoresis for Summer 2019 Samples