TARLETON STATE UNIVERSITY
Timberlake Biological Field Station

CONFOUNDING FACTORS AFFECTING SOIL HEALTH DURING FIELD RESTORATION

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Soil samples were taken at a Grazing Experiment located at Timberlake Biological Field station to analyze long term effects of cattle grazing on land restoration. The Grazing experiment, built in 2018, includes three replications of three treatments, a set of pastures open on one side to allow for cattle to enter and graze, pastures with low fences to allow for deer entry, and a set of plots that have high fences designed to exclude both cattle and deer. Each rep of each treatment was split into four sub-reps, and composite soil samples were taken by taking 7-10 core samples from 0-15 cm. These were taken back to the lab for analyses. A portion of the subsamples were packaged and sent to Texas A&M Plant, Forage, and Soil Testing laboratory for analyses of pH, secondary, and micronutrient analyses. Subsamples were also sent to Texas A&M AgriLife Research in Stephenville, TX for analyses of total carbon and nitrogen. Additionally, analysis of ammonium nitrogen and ortho-phosphorus took place in the TIAER lab. Aggregate stability testing and permanganate oxidizable carbon testing took place as well. When analyzing data, we observed that some plot's results stood out amongst others and speculate this may correlate to the plots location across the experiment. Our plot labeled as "Open 2" has low aggregate stability and variable nitrogen levels, this may be due to Open 2 facing the west and there being ample shade for cattle congregation, possibly leading to more cattle grazing on this plot opposed to the other open plots. While our plot labeled "Low 1" has lower levels of microbial activity, this may be due to Low 1 being immediately east of a tree that provides shade and contributes to a higher moisture content. In 2019 soil samples were taken by a previous REU participant to analyze soil nutrients to determine soil health. When comparing permanganate oxidizable carbon results with those from the previous student, we observed decreases in oxidizable carbon and stability seen across treatments as time passes. These may be due to the removal of cattle from the High and Low treatments, and cattle being completely removed from the property as of 2020. Further testing would be needed to determine the exact cause of the changes seen across the experiment. However, testing completed as of now may provide some insight as to how Timberlake Biological Field Station may change in upcoming years, and also how any land being restored from previous cattle use may change as cattle are removed.