The Correlation Between Road Salts and Electrical Conductivity

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THE GLOBE PROGRAM
Global Learning and Observations to Benefit the Environment

Abstract

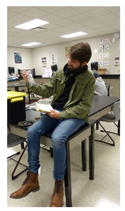
Our research was done to test whether there is any correlation between road salts and electrical conductivity. We decided to look at the correlation between these two attributes to see how laying road salt down affected the nearby farm fields. The solution would reveal an explanation to the high electrical conductivity levels in the soil around Garrett, Indiana. Our team found that the electrical conductivity was much greater after the salts were laid. The electrical conductivity levels rose after salt trucks drove through,, and continued to rise for a month later. Our findings led to the conclusion that laying road salts on icy days is not good for the nearby soils, for it causes the electrical conductivity to rise.

Question/Hypothesis

From December to April, there tends to be waves of high levels of electrical conductivity in the soil around Garrett, Indiana. Our research is aimed to establish an answer to the question: why are there high levels of electrical conductivity in the soil. We hypothesized that this was due to the salt that is laid on roads during winter. All of that salt gets pushed into the ride of the road and surrounding soil, and that salt leads to higher electrical conductivity levels. This is bad for farmers who may wish to plant crops on that soil. We used the GLOBE Soil Fertility Protocol as a guide to help facilitate the data collection and analysis process.

Introduction

The research we have done is important because our results showed that the road salts due in fact raise the electrical conductivity levels in the ground. This provides an answer to the question of why we had found high levels of electrical conductivity in the soil previously. These results can lead us to conclude that the soil may not be the best to farm on in the area, because there will always be more salt getting added to those soils.



Research Methods

Figure #1

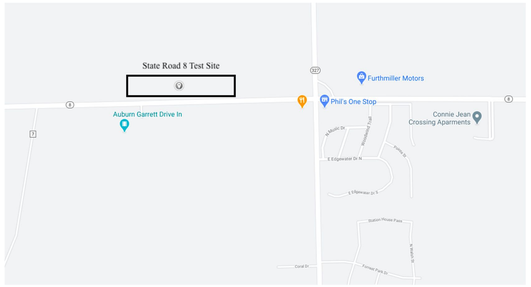


Figure #2

Our plan to collect data is to use the GLOBE Protocol for soil testing. We will use the protocol to analyze our soil and test the salinity levels that are present in it. This plan will give us very essential data to answer the question of whether or not there is a correlation between the salinity and electrical conductivity in the soils. We will use a Hanna EC Tester to test for the electrical conductivity in the ground. We will test three different locations at two different sites, once a month until it was winter then testing whenever it snowed, over a span of 4 months. The first site is State Road 8 in Garrett, Indiana, which is a high traffic road and frequently salted. The next would be the Youth Soccer Fields in Garrett, Indiana, which was used as a control since the ground would not get salt run off from the road. The time of the day will be around 1 to 4 in the afternoon.

Results

The results we got were very low for both electrical conductivity and salinity. When reviewing the results we found that after the snow fell and the roads were salted, the salinity needed to dissolve. We found the highest electrical conductivity a month the roads were not being salted. Though further testing showed that it left the soil and did not linger in it more than a few weeks. Our results show that there is a correlation between the salinity and electrical conductivity in the soil. This conclusion has been made because we found a set correlation between the two. There are more efficient ways to testing soil that could give different, more accurate results, but those were not available to us. The data we received with our tools showed us a correlation.

Figure #3

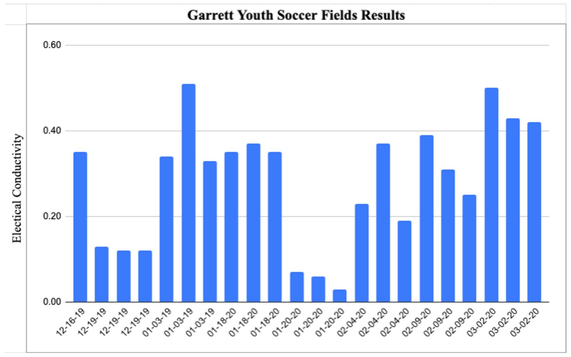
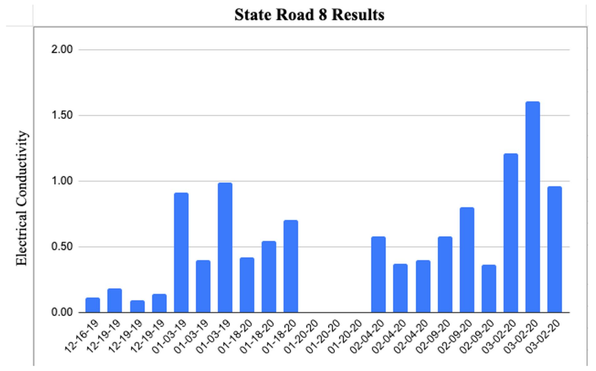


Figure #4



Discussion

Interpreting Data

The results we were able to see from our data were small rise fall in the EC levels with the rise of salinity. The results we were able to see was how the soil would not hold the salinity or would bleed it very quickly . EC and salinity levels which will then show the results of salt going into nearby soil. The results helped answer the research question showing the correlation between EC and salinity levels giving a the two showing a connection. Through our research we have seen that a correlation between EC and salinity but when drawing this conclusion with our own data we were able to draw the same concrete conclusion. Possible problems with the experiment would be the instruments we used to test the samples, it was not tested with multiple devices to check the results. Another thing would be the qualification of us, this being the first time we have ever done field research.

Conclusions

After testing a neutral site (where there were no salts laid) and comparing those results with tests from a salted site, we conclude that road salts do in fact affect the nearby soils. We found that a couple of days after salt is laid, the electrical conductivity begins to rise, but it peaks after about a month. Our highest results of electrical conductivity came from a month after salt had been laid. This concluded the question why there were such high levels of electrical conductivity in the area soils, and can lead us to believe farming on that soil may reduce crop yield.

Bibliography

- "Globe Home Page." *The GLOBE Program*, https://www.globe.gov/web/soil. Accessed 20 Nov. 2019.
- "Soil Fertility Protocol." *GLOBE*, https://www.globe.gov/documents/352961/5d7d7dab-3bc5-4424-9354-f395b928d151. Accessed 20 Nov. 2019