Testing Nitrate Levels In Farm Soil (Conventional vs. No Spray)

Olive Lerch, Reuben Philips, Sienna Johanesen
Geology 100

1. Research Question & Background

Our team decided we were interested in researching the nitrate levels in farm soil from conventional and no-spray farms. Our conventional farm was Hughes Farm in Mount Vernon. The no-spray farm was Joe's Garden in Bellingham. We chose this because of our interest in other studies about the use of natural vs chemical fertilizers. Based on past studies we read, manure heavy fertilizers add more nitrates to the soil as opposed to chemical fertilizers (Panday), and that crops grown on farms with nitrate heavy soil can wind up containing heavy levels of nitrates themselves (Aires).

2. Materials

- *5x 100ml beakers*
- *Coffee filters, and disk filters*
- *Distilled H2O*
- *Stir stick*
- *Buchner funnel with side arm flask*
- *Nitrate probe*
- *Soil samples*

Figure 1: Buchner funnel pressurizes and funnels the solution through a filter.

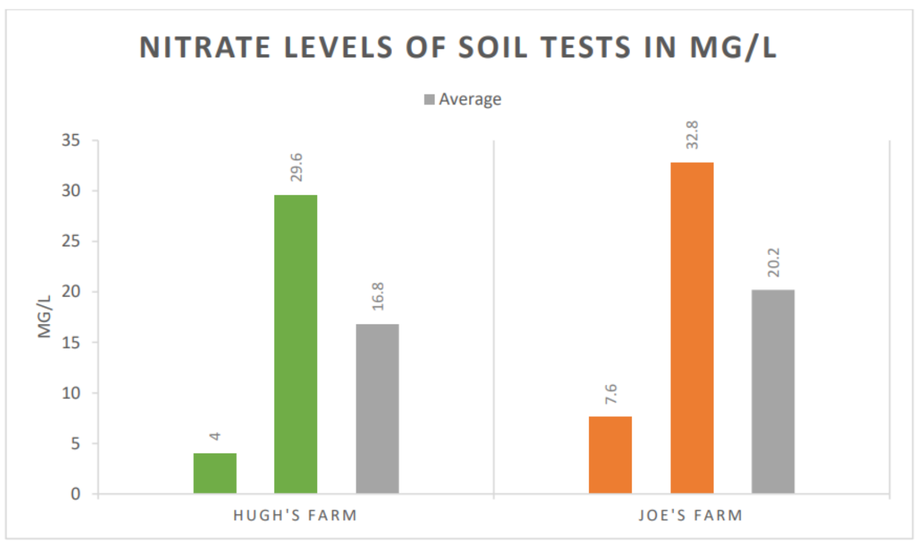
3. Procedure

Attempt 1: Gather all recourses, add the dirt sample into a beaker with water, and agitate. Pour the mixture over a coffee filter. Once filtered test liquid with a nitrate probe. liquid

Attempt 2: Gather all recourses and add dirt sample into the beaker. Then add water to the dirt and agitate. Pour into Buchner funnel. (See Figure 1 above)

4. Results: Our results were fairly similar for both farms. The average for Hughes farm was 16.8 mg/L whereas Joes farm was 20.2 mg/L. (See 4a below for data analysis from farms)

4a. Comparing Nitrate levels at Hughs Farm Vs. Joes Garden



	First Sample	Second Sample	Averages
Hugh's Farm	4	29.6	16.8
Joe's Farm	7.6	32.8	20.2

Comparison of nitrate levels between Hughes farm and Joes garden.

Figure 2: Hughes Farm, 48.327250 degrees N, 122.36966 degrees W Soil is dense, heavy, and composed of mostly clay.

Figure 3: Joes Farm, 48.72495 degrees N, 122.47676 degrees W Soil is loose, aerated, and drier.

5. Interpretations

Our results showed to be the opposite of our hypothesis. There was a large variation in the data collected from both farm plots, and we hypothesized that the differences in crops that take or give nitrogen could have been present before the fields were tilled in for winter. Along with the proximity of these areas to waterways nitrogen-rich soil can leach into the water, leading to overstimulation of growth of algae which then blocks light into deep waters and "kill" a waterway by depriving it of oxygen (Nitrogen).

The conclusion that we came to was that we should have collected and tested more samples from a larger area for a greater range of data and more accurate results. Based on research also included in this poster we would assume that our hypothesis could still be supported with more time and broader samples of dirt from these farms.

An interpretation of the controversial findings could be explained by Hughes using monoculture practices, only cultivating one crop per year (potatoes), whereas Joe's garden uses polyculture practices by rotating crops throughout the growing season. Having several different crops either adds to or takes away different levels of nitrogen in the soil. Monoculture relies heavily on synthetic chemicals to add nitrogen to their fields, versus polyculture which reduces this need for synthetic inputs and helps the soil health over time leading to more sustainable farming practices (Braganza).

6. Acknowledgements

We firstly would like to thank the Swinomish and Nooksack peoples whose land we occupy and use, and where we collected the soil samples used in this research project.

We secondly want to acknowledge and thank Dr. Kaatje Kraft for instructing the course and our WCC lab technician Kris Harrell for assisting in our data analysis. We also thank Jason Weston who is the current owner of Joe's Garden for talking with us about nitrate data that has been collected in past years on his farm.

7. Work Cited

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