Intro to Soil and Soil Health
Objectives

- Students will understand:
  - How soils are formed, and the hierarchy of factors affecting formation
  - The concept of soil texture and its importance to agriculture
  - How soil texture is determined

- Students will begin to develop a framework for understanding scientific research articles
Week 1 Tasks

- Read Chapter 1 in
- Read the article:
  - [https://www.sciencemag.org/careers/2016/01/how-read-scientific-paper](https://www.sciencemag.org/careers/2016/01/how-read-scientific-paper)
- Draft a working framework of how to read an article
- Test the framework out on:
- Bring a soil sample to class (by Tuesday Jan. 15th)
- Answer questions from powerpoint and upload to Blackboard or Weebly
Why Science Writing

• Relay information to an audience (generally your peers) about current research findings.

• Science writing is HARD!
  • To actually do (no flowery words)
  • To follow

• Use of huge words, strange sentence structure, formatting rules and figures.

• From any article there is a basic format of the scientific method.
Step 1

- What is the article trying to prove or do?
- What is the point of the study?
- **Simple determine : The question**
  - Often found in the first few sentences or at the end of the introduction of an article
  - Look for words such as
    - The objective was
    - The goal of the study was
- A great rule of thumb is to quickly scan the introduction.
Step 2

- Write Down the QUESTION!

Introduction

Reliable estimates of clay- (<2 µm) and silt-sized (2–20 µm) particles in soil are now more important than ever as the use of pedotransfer functions are becoming increasingly abundant. Based on clay and silt contents, pedotransfer functions include attempts to predict soil water characteristics [1, 2], solute transport [3] and particle density [4]. Using reference values from conventional soil texture analysis, soil spectroscopy has been adopted as rapid methods to predict clay and silt contents [5–7]. Prediction of soil clay content from soil water characteristics is another rapidly progressing line of research based on pedotransfer concepts [8, 9].

For our ongoing research on the potential of soil clay/carbon and Fines20 (mineral particles <20 µm)/carbon ratios in defining critical low soil organic carbon (SOC) contents in agricultural soils [10, 11], it is essential to have access to exact values for clay and silt contents. This need is amplified by a recent study attempting to incorporate clay/SOC ratios to map the impact of management on soil quality at European scale [12].

Removal of soil organic matter (SOM) is recommended as a pretreatment before particle size analysis (e.g., [13]) to ensure effective dispersion of micro-aggregates. The internationally published studies originally underpinning the effect of SOM removal on estimates of clay and

The first sentence starts to show the question
By suggesting that soil particle content and how it is
currently measured isn’t reliable.

Further suggestion in intro continues to punch holes in the
current methodology or that the field is advancing
rapidly away from norms.

Initial take away:
Something is wrong with the current method
Authors are indicating that it is vital to have exact particle
Information for best results.
silt contents date back many decades [14–16]. These studies were based on a limited number of samples retrieved from contrasting sites, which prevent quantification of the effect of SOM per se on clay and silt estimates. Moreover, the historic studies applied less reliable methods for determination of SOC such as dichromate oxidation/titration and loss-on-ignition converted to SOC by division with the factor 1.724, a factor with a dubious scientific foundation [17]. Thus, we found it necessary to revisit this fundamental issue of soil texture analysis and examine in more detail the quantitative significance of SOM removal on clay and silt estimates.

This study quantifies the effect of SOM removal by H₂O₂ on the determination of clay and silt-sized particles using samples covering a wide range of SOC and clay contents. The samples were retrieved from three long-term field experiments each with a uniform mineralogical and textural composition.
Step 3

• How are the authors going to answer their question?

• Look at Materials and Methods for a breakdown of how.

• The introduction will also give a brief description of how this is done
How will the question get solved?

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Last paragraph uses wordings like study quantifies SOM by....

Now look deeper into the methods.
Step 4

- Read the results
- Do the figures and tables and data the authors obtained make sense?
- Does this data answer the question?
- The often boring part of the article but this will let you the reader know if the study is solid.
Step 5

- What do the results really mean?
- Read the discussion and conclusion
  - This is how the authors obtained their idea of how the question was answered and will give insight to future discussions.
  - Often in science data that doesn’t answer the original question isn’t published. All data is important! Experiments that don’t prove our questions still determine something!
Step 6

• The abstract
  • Often read first and people think it will give all info they need to use article as a source in a lit review.
  • NO-this is wrong. Read the article and then the abstract. It is a very brief version of the paper that often leaves out important details!
Does article structure remind you of anything from science class?
The Scientific Method

- Basic structure to design a study or frame an article.
- Article structure is based on this concept.
Things to Upload to Blackboard

• Please upload a copy of your initial framework by Friday morning.

• NOTE: If you are a Weebly student, turn in your assignments to bluestem@fortreno.org

• Also create a file that answers these questions:
  • What is your name?
  • What do you want to be called?
  • Give a definition of soil in your own terms.
  • How does soil alter your life?
Friday fun

• Let discuss the frameworks you created for article outlining.
  • We can alter them and we will make a class framework.