



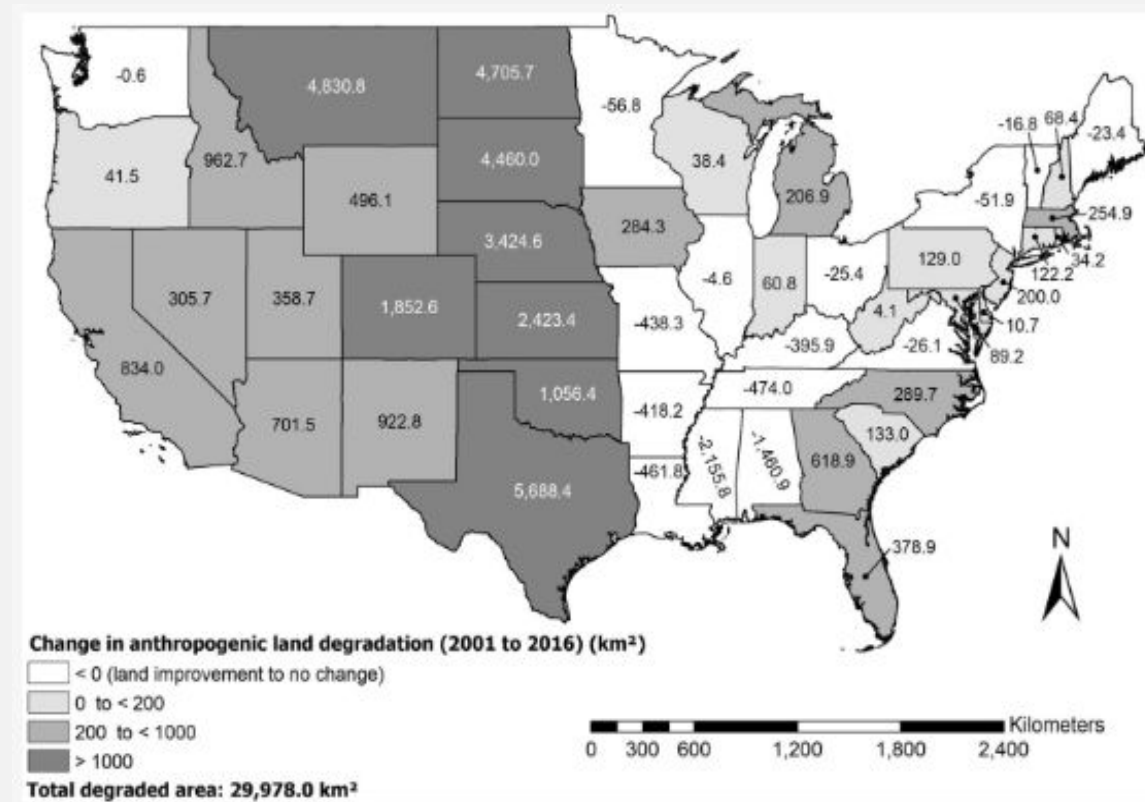
Soil pH Research and Literacy

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Project Motivation & Goals

Healthy soil is critically important for productive agriculture. With overuse of agriculture, soil can lose valuable nutrients and become degraded, which can result in low crop yields¹. One recent study found that an astonishing 34% of agricultural land in the United States has been degraded over the past 20 years.



Change in anthropogenic (human caused) land degradation status is presented as the total degraded land area (km²) over time (2001–2016) in 48 states in the USA. Anthropogenically degraded land was a sum of degraded land from agriculture (hay/pasture, and cultivated crops), development, and barren land.

Soil pH - how acidic or basic the soil is - influences the amount of different nutrients available to growing plants, and can vary based on geographic location. Nearly all naturally occurring Connecticut soils are strongly acidic (pH 4.5-5.5)², which means to successfully grow crops, it may be necessary to add chemicals to adjust the soil pH.

Project Objectives

- Conduct background research on soil health
- Experimentally test the effects of soil pH on plant growth
- Raise awareness about the importance of soil health and share results of experiment to the community

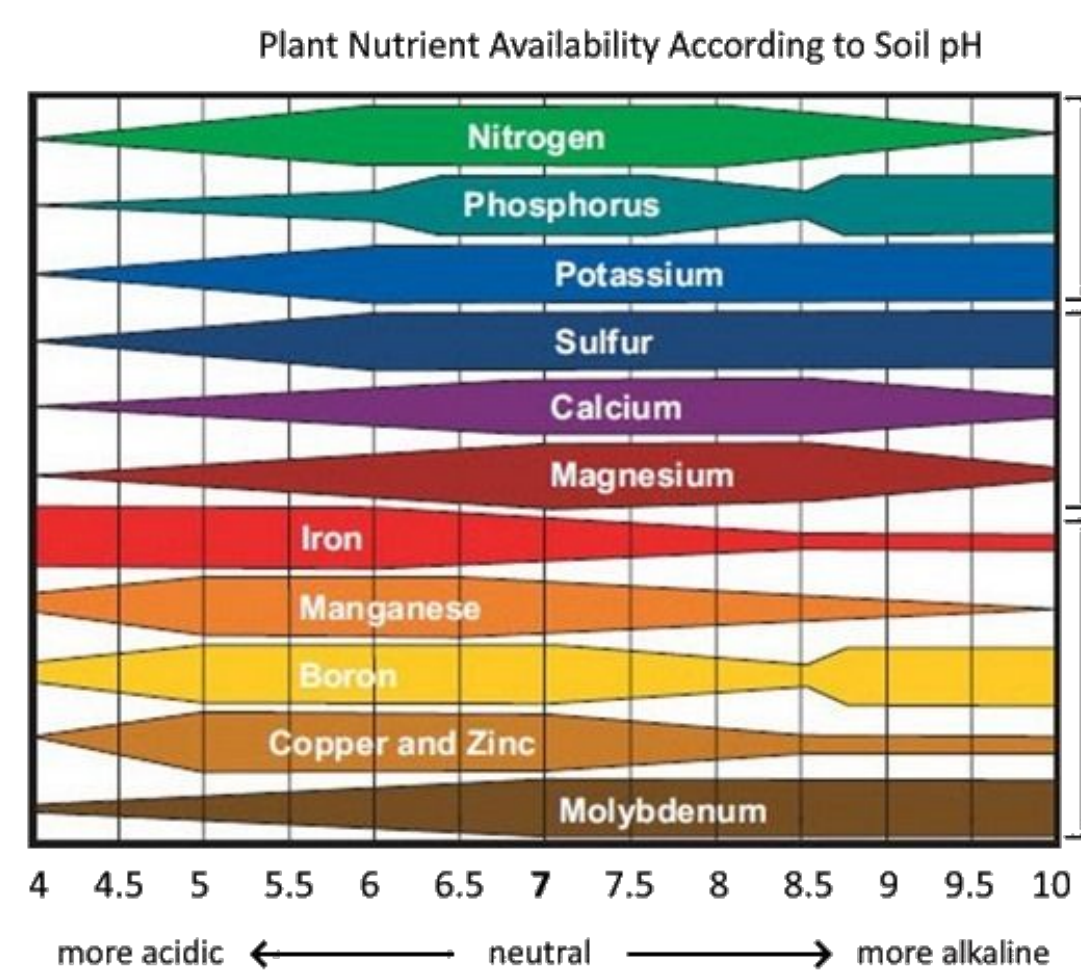
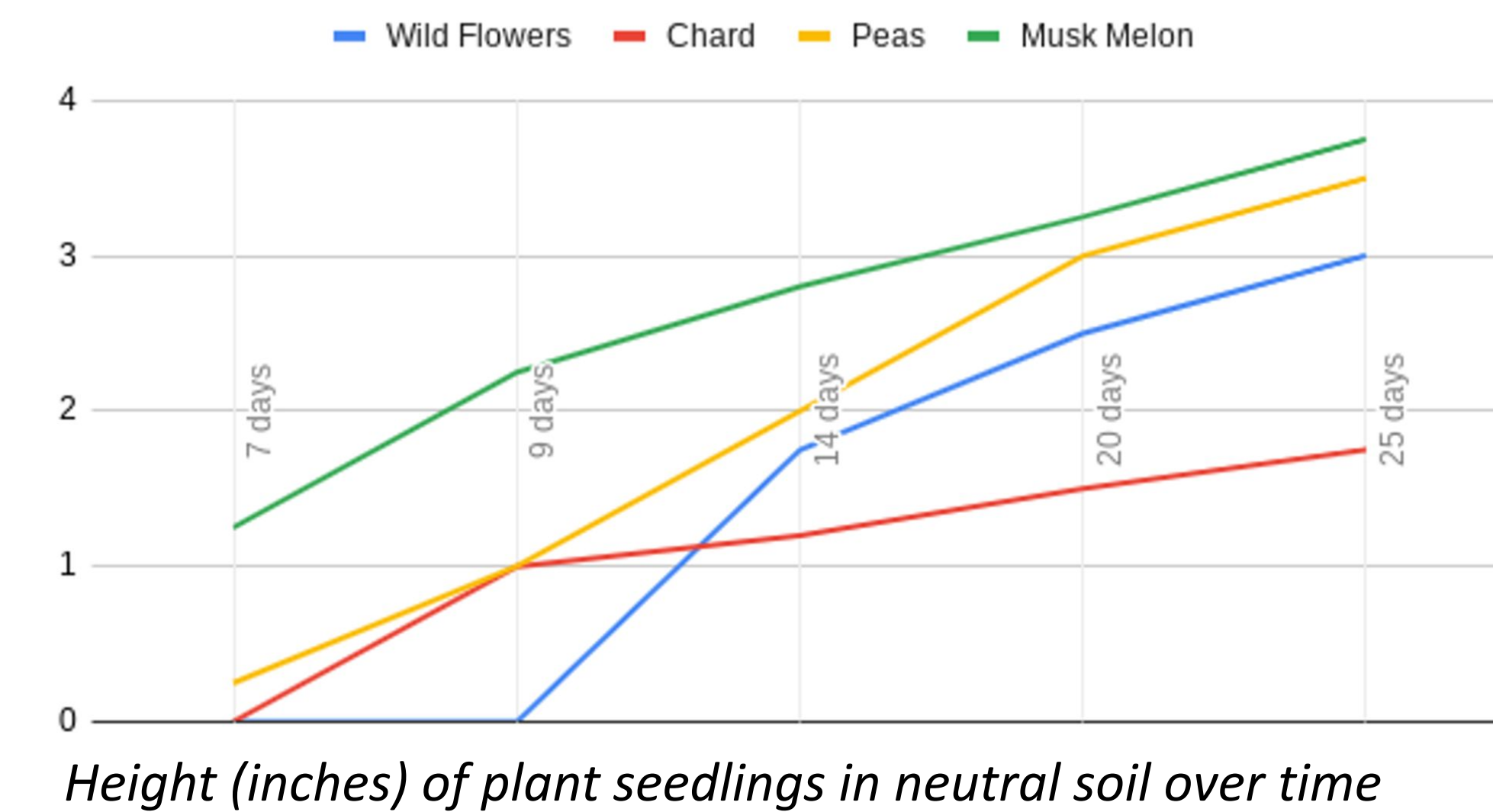
Project Outcomes

Soil Health Experiment

- **Basic Soil: 8.02**
 - Swiss chard was the only plant able to grow in the basic soil, however it only grew to about 0.25 inches before it shriveled up.
 - According to the University of Minnesota, Swiss chard prefers a more neutral pH, but can tolerate a pH of up to approximately 8.
 - The failure to thrive was possibly due to a lack of phosphorus in the soil.
- **Neutral Soil: 7.24**
 - Snap peas, muskmelon, and wildflowers all grew well in neutral pH soil (see figure)
- **Acidic Soil: 6.03**
 - Nothing grew in the acidic soil

Community Workshops

- In total, 15 people attended the live presentations
- The workshop recording is also available to anyone
- These events helped people understand the growth of their gardens.
- Many attendees expressed how helpful it was to learn about our soil and how much it can affect our agricultural systems.



The thickness of lines for each nutrient vary at different pH levels, where **thinner = less of that nutrient** and **thicker = more of the nutrient**



Testing the pH of the soil using a pH detector connected to a Chromebook.



How does this impact me?
 "Nearly all naturally occurring Connecticut soils are very strongly to strongly acid (pH 4.5-5.5)" (University of Connecticut)

If you want to test your soil's pH there are tools and kits available at stores like Lowes, Home Depot, Walmart and are usually available in any gardening store

Solution- Limestone naturally alkaline with high pH levels

Presentation slide from the community workshop; Scan QR code to view or see the NRCA Youtube Channel (<https://youtu.be/pCxyIJQ9uRY>)

Project Steps

Soil Health Experiment

- Conducted between March 2-28, 2025
- Treated soil with sodium carbonate and sodium bisulfate to increase/decrease pH
- Planted and germinated Swiss chard, wildflowers, snap peas, and muskmelon at different pH levels in an environmental growth chamber to control the temperature and light
- Measured, recorded, and compared soil pH and final plant size

Community Workshops

- Community workshops focused on:
 - Raising awareness about the pH in our soil and how vital it is to our soil's health
 - Giving the public an understanding on how they can maintain their soil's health
 - Reinforced by my experiment results
- Hosted live virtual workshop on March 29th and 30th, 2025 and posted video recording on April 9th, 2025



Setting up the environmental growth chamber. pH treatments from left to right: basic, neutral, and acidic soil.

Community Partnership

- Killingly High School's Agricultural Education Department has helped tremendously by helping me get resources as well as giving me the space and equipment to conduct the soil experiment.
- They allowed me to use equipment such as their growth chamber, pH changing substances, and pH readers.
- Their food science and biotechnology teacher, Ms. Lopez has offered me guidance in using the equipment and scheduling times during the school day and after to work on my project.



Conclusion and Next Steps

- During this project I observed how much of a difference soil health makes for a plant's germination and growth.
- It has been shown through the results that there needs to be a balance and abundance of nutrients for plants to grow.
- Through my presentation, I realized how little the general public knows about soil health.
- There should be more opportunities for them to have access to Ag Literacy to help them with environment and agricultural spaces of their own.

Acknowledgements and References

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- Finally, thank you to the University of Connecticut's NRCA Conservation Ambassador Program for the \$1,000 stipend

1. Nuccitelli, Dana. "UN Report: The World's Farms Stretched to "a Breaking Point"" Yale Climate Connections." Yale Climate Connections, 19 Jan. 2022, yaleclimateconnections.org/2022/01/un-report-the-worlds-farms-stretched-to-a-breaking-point/.
2. McBride, Jessica. "Improving Soil Health in Connecticut with a Systems Approach - UConn Today." UConn Today, 10 Jan. 2025, today.uconn.edu/2025/01/improving-soil-health-in-connecticut-with-a-systems-approach/. Accessed 2 Apr. 2025.