

I. Guiding Question/Thesis/Idea

Synthetic fertilizers are well known to create high yields of crops with minimal investments relative to income generated by most crops grown in wealthy countries. But in countries with less developed economies, synthetic fertilizers often represent a cost that is unsustainable for the small farmer. Synthetic fertilizers also have negative ecological effects that can be mitigated by using natural fertilizer such as compost or manure. For my project I want to investigate whether radishes grown with only natural fertilizer can create a yield comparable to beets grown with synthetic fertilizer. Because newly planted radishes are normally ready for harvest within one month of planting, I will have time to run several conditions of radishes and measure the outcomes of radishes grown with synthetic fertilizer, natural fertilizer, and with no fertilizer at all.

II. Method of Research

This research will involve both a **literature search** and an **experimental design**.

For the **literature search**, I will investigate studies done on the comparative effects of synthetic and natural fertilizers, especially on radishes. I will use the information gained from the literature search to form my hypothesis, investigate experimental designs, and determine proper dosing guidelines for the fertilizer types.

For the **experimental design**, I will create a series of randomized trials in which I compare batches of radishes grown in three conditions: 1.) without fertilizer, 2.) with chemical fertilizer, and 3.) with natural fertilizer. The yield from each condition will be harvested and measured for total production by weight. This information will help provide information on the possibility of creating high yield radish crops without the use of expensive artificial fertilizers.

III. Outcomes/Product

The outcome of this research project will be an experimental writeup completed in APA style with the standardized sections found in research papers published in scientific journals. The essay will be at least **12 pages** in length. I will also create a power-point presentation to share my findings with the class in a **10-minute** discussion.

IV. Project Timeline

- **September 2:** Honors Project Proposal Submitted. Literature search begins.
- **October 1:** Complete summary of literature search, and proposed experiment design.
- **October 7:** Plant seeds for all three experimental conditions
- **November 4:** Harvest all plants and measure outcomes
- **November 20:** Rough draft of APA style essay turned in to my professor
- **December 9:** Final draft of experimental write-up completed and submitted

I will meet with my instructor at least **once every 3 weeks** to discuss my progress, plans, and results as my research project progresses.