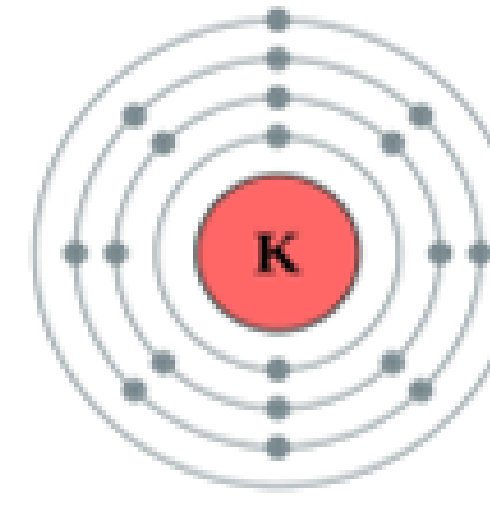
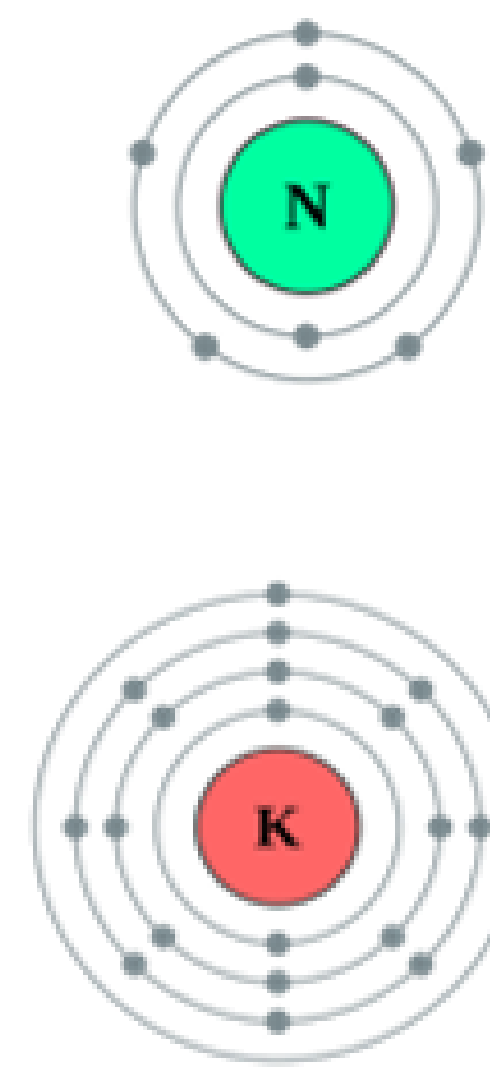


Comparing the Effects of Various Fertilizers on the Germination Rates of Various Herb Species

Maureen Cagnon, Sarah Greeley, Kavon Salehi, Sarah Schmidt, Joshua Schuman, Taylor Simkins, Tyler Tischler, & Alyssa Yerkeson



(Below) Three pots had 3 different fertilizers and one pot had no fertilizer added (control).



Germination Trays Methodology

For the first part of the experiment, the seeds were germinated in homemade germination trays. Each participant took four plastic containers, lined the bottom of the containers with a damp paper towel, and sprinkled 40 seeds on top of the paper towels. One of the germination trays contained only seeds and the paper towel. This grouping is referred to as the control group. The three other germination trays each contained different fertilizers: one contained Urea Nitrogen fertilizer, another contained Easy Peasy Plants Potassium fertilizer, and the third contained Triple Super Phosphorus fertilizer. One teaspoon of each fertilizer was added straight from the bag in rock form to the separate germination trays.

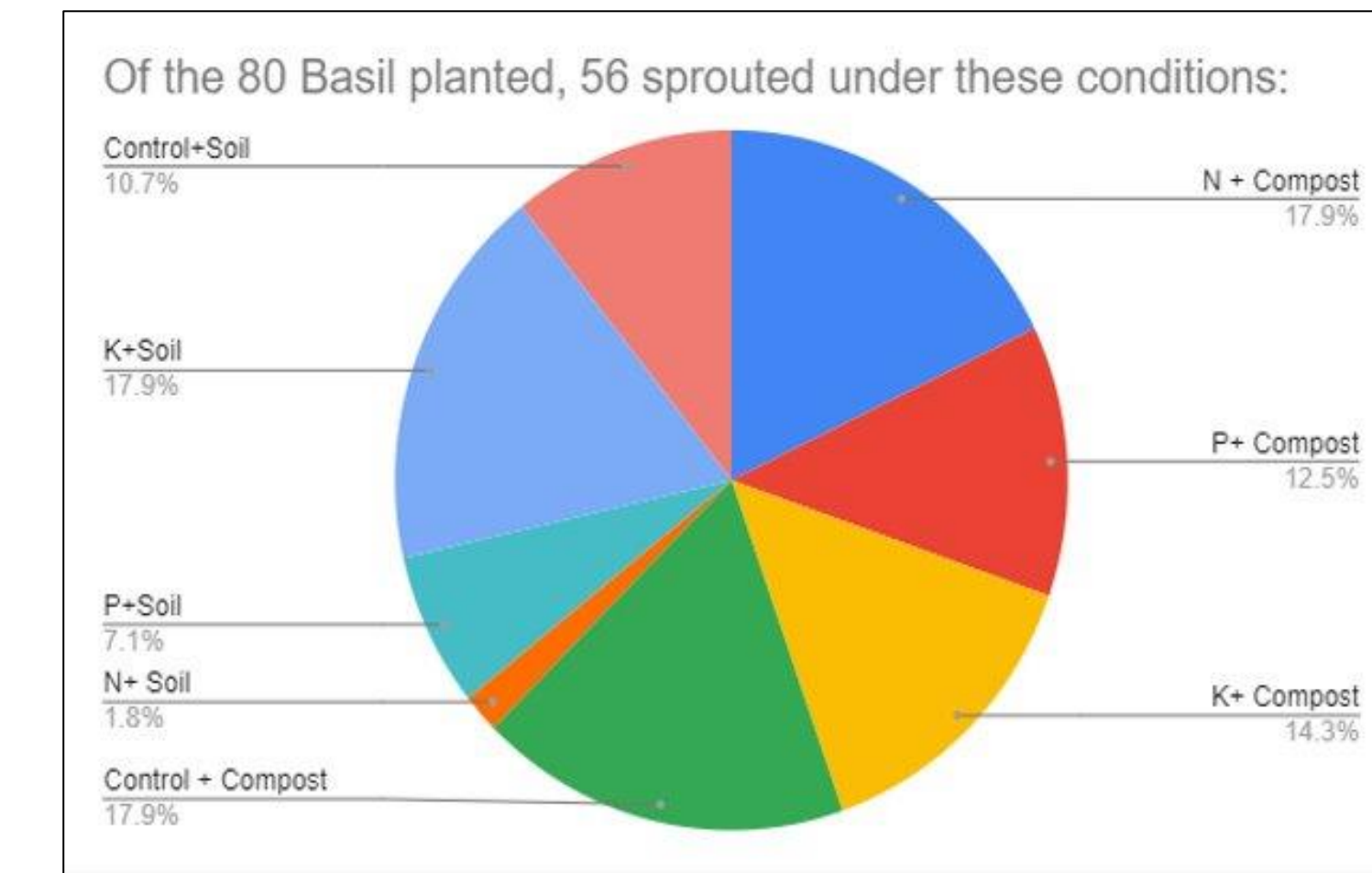
Eight participants made up the group, so everyone was paired with another to compare the effects of grow lights versus natural window lighting. One partner pair germinated oregano, another partner pair germinated basil. The third partner pair germination parsley, and the fourth pair germinated sage. The grow lights were set at high power for 12 hours a day. The participants germinating with natural window lighting chose a room that contained moisture and humidity with 12-hours of indirect lighting daily. All trays were sprayed with a spray bottle 5 times daily to keep the paper towel moist. Additionally, there were some participants that covered their trays with plastic cling-wrap and some participants didn't cover their trays at all.

Potting Methodology

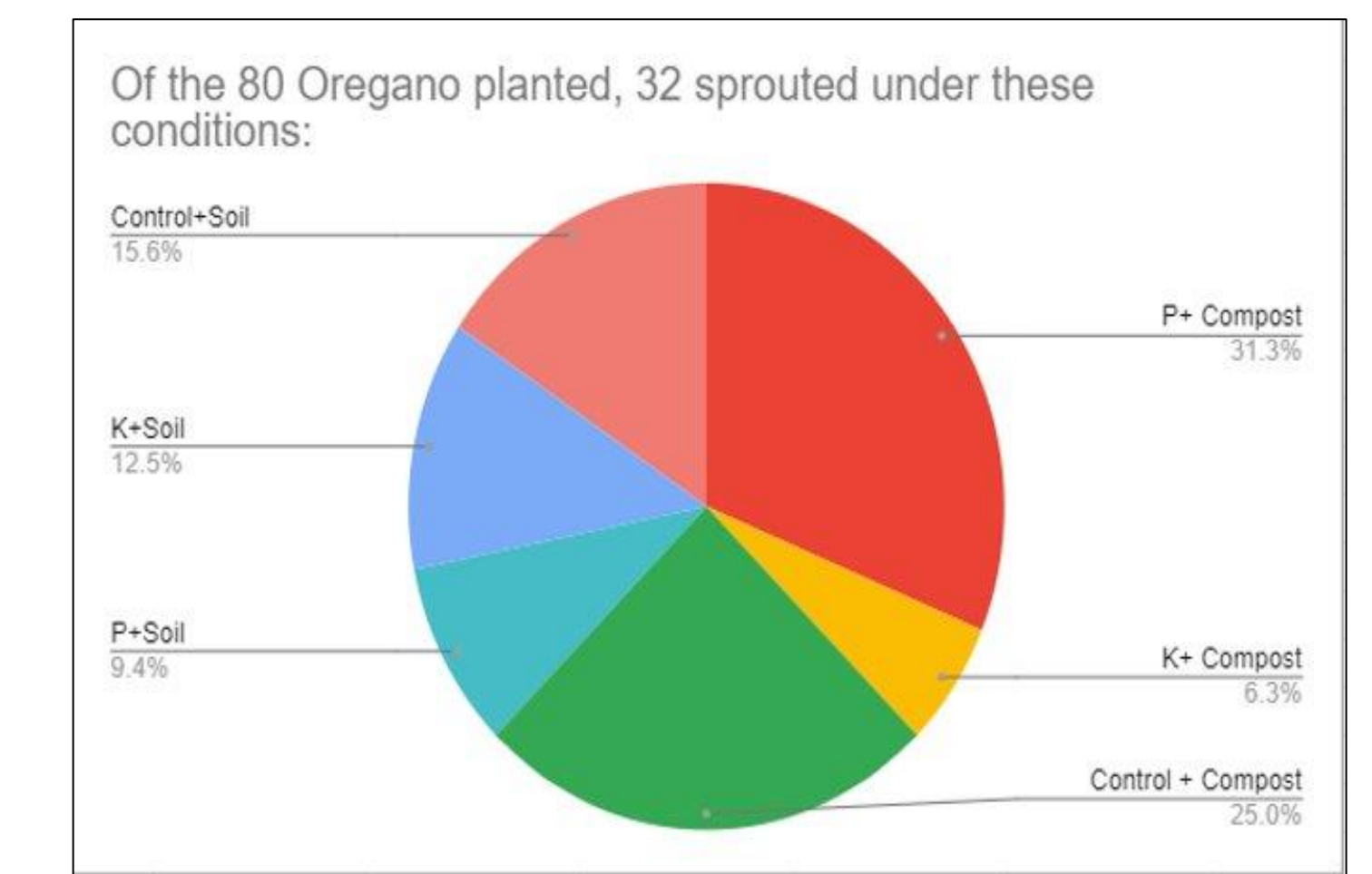
For the second part of the experiment, the group performed another germination process that involved planting the seeds directly into 6-inch flowering pots. Each pot had 1 cup of pebbles as the bottom layer, with 5 cups of Expert Gardener Potting Mix. This type of indoor and outdoor potting soil contains nitrogen, phosphate and soluble potash. All pots were set directly next to the window that received 12 hours of light each day.

We also compared the effects of compost versus potting soil during the experiment. Half of the group performed their experiments with another cup of potting soil as the top layer. The other half of the group performed their experiments with 1 cup of kitchen compost as their top layer. The kitchen compost mainly consists of eggshells, wood chips, banana peels, broccoli stems, peppers, onion peels, and leaves. All pots had approximately 10 seeds planted 1/4-inch below the top layer.

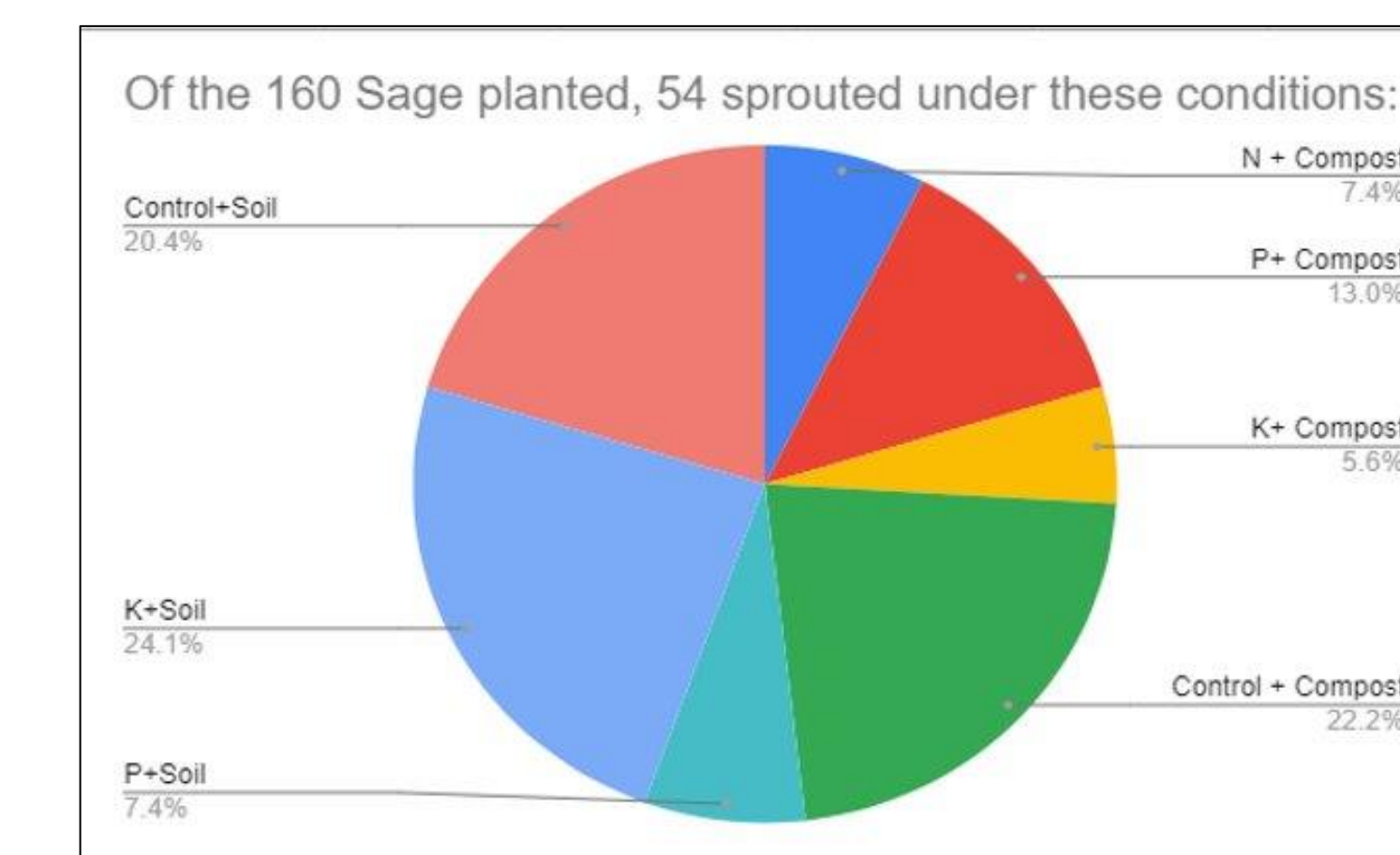
Each of the fertilizers tested were diluted with water before applying to the newly planted seeds. The dilution ratio was 1 tablespoon per half gallon of water, shaken thoroughly before applying. Every day of the week, we watered the pots. One pot was designated to receive no diluted fertilizer, while each of the other three were split up by the diluted fertilizer that was added to them every Wednesday and Sunday morning. Every morning each pot received 1/4th a cup of water. To avoid over watering, we felt the soil's moisture by finger before watering each morning.



Results for Basil out of 80 seeds



Results for Oregano out of 80 seeds planted



Results for Sage from 160 seeds planted

Discussion

During this experiment we ran into a couple of issues. The first thing we noticed right away was that the germination process was taking longer than we expected, the information we found on the seeds said some will sprout within a week and others could take up to a couple weeks. Another issue we ran into with the germination process was the fertilizer we used was slowing the process of the seeds sprouting and if the seeds would sprout within a couple of days, they would die off. With so many people in this group there were some miscommunication issues, some people put plastic wrap over their trays while others did not. This not only allowed for mold to grow on the seeds with plastic wrap this all so caused an inconsistency in the project and making it impossible to recreate the experiment. We decided at this point to scrap the germination of the experiment and start over.

When it came to the second round of this experiment with just potting the seeds and skipping the germination the first issue, we came across was adding too much water. The way we fixed this problem was by doing more research and found the right amount to water every other day. Some of us had issues with gnats and spider mites, we found an article that said to spray one part hydrogen peroxide and three parts water, spray every day. Another solution some of us found worked was using sticky fly traps.

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Abstract

In this study, we will compare the individual effects of nitrogen, potassium, and phosphorus fertilizer on the germination stages of oregano, parsley, basil, and sage in an indoor setting. Germination was conducted in two parts: one part with seeds in homemade germination trays and the other part includes planting seeds directly into pots. We additionally compared grow lights versus natural window lighting, application of fertilizer in rock form versus diluted with water, and compost versus soil bedding. The focus of the study is to examine these different aspects of indoor gardening with the aim to educate homeowners of the best practice to pursue when growing indoor herbs. At the conclusion of the study, we discovered the different preferences of germination setting for each of the herb species.

Introduction

The composition of fertilizers consist mainly of the three major macronutrients: Nitrogen, Potassium, and Phosphorus. These three nutrients are what ensures plants will have optimal growth, give the highest yield, and grow to their full potential. There is no dispute as to whether utilizing them works or not. The science field has already established that they have a very necessary place when it comes to growing crops, or any plant for that matter. Specifically, what we already know is that nitrogen will help a plant maintain their health and promote photosynthesis. This includes the formation of chlorophyll and the growth of the plant cells and tissue ([link](#)). We already know that phosphorus helps a plant convert other nutrients into usable building blocks to grow. If the plant is small, is not producing flowers, or has a weak root system, it is probably because there is a phosphorus deficiency. Furthermore, we know that potassium is not used in the structural synthesis of biochemically important molecules but is found within the plant cell that maintains the turgor pressure of the cell. It also allows water vapor and waste to escape through the bottom of leaves. If a plant starts to yellow or crinkle, it probably needs more potassium ([link](#)).

With that being said, the purpose of the experiment was not to study the effects of what N,P, and K do, but was to study how each of these nutrients might optimize the growth of various indoor herbs. Most studies with N,P, and K are conducted on corn or lettuce, and on a much larger scale made for agriculture purposes. This study will focus on a small scale, indoor use for every day-to-day people. Maybe sage thrives on higher potassium levels and oregano needs more phosphorus. Students analyzed the differences of these amendments between basil, oregano, sage, and parsley. Not only are N,P, and K added, so is compost. Compost is easily accessible, affordable, and most households can utilize this amendment.



(Above) How germination trays were set up.