

The Effects of Isopods on Environment

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Hypothesis/Research Objective

- How do isopods affect the soil of their habitat?
- If an area of soil has isopods, then it will be more fertile. This soil will have a healthier pH, average CEC, and nutrient levels.
- The goals in this experiment are to assist in showing the importance of the creatures in our local ecosystem, in a time of change. It is a basic fact of our environment that decomposers are beyond essential to everything living thing. Without decomposers our soils would lack the necessary nutrients and general fertility to sustain life. This is especially important in our community, because we are in a large agricultural state. If our soil could not sustain crops and vegetation, not only would we not have food, but we would also be losing a major source of revenue in our economy. This research should highlight the importance of these decomposers, specifically isopods. In the environment of central Indiana, you would most commonly encounter common terrestrial pill-bugs in average soil, so an important note is my use of powder blue isopods and coconut substrate in my experiment. However, it should still show the key factor that is isopods in the environment.

Methods

- **Materials**
 - Porcellionides pruinosus (Powder blue Isopods)
 - Coconut substrate
 - 40-gallon tank
 - hygrometer
 - Spray bottle
 - Distilled water
 - Leaf litter
 - Hides
 - Sphagnum moss
 - pH meter
 - Soil test kit
 - High-calcium cricket diet

Procedures

1. Prepare a 40-gallon tank, coconut substrate, leaf litter, hygrometer, a hide, sphagnum moss, and distilled water.
2. Set up your tank, ensuring to have sphagnum moss in two corners.
3. Take a substrate sample from both spots under the moss, under the hide, and in the center with nothing.
4. Put your samples in a 2:1 slurry, then test the pH, nutrient level, and Cation Exchange Capacity (CEC).
5. Release ~30 Porcellionides pruinosus into tank.
6. Water tank daily with a spray bottle, using distilled water.
7. Feed isopods weekly.
8. After 2 months, collect substrate samples from both places under the moss, under the hide, and in the center.
9. Put your samples in a 2:1 slurry, then test the PH, nutrient level, and Cation Exchange Capacity (CEC)
10. After another 2 months, repeat steps 10 and 11.
11. Compare data.

Data/Results

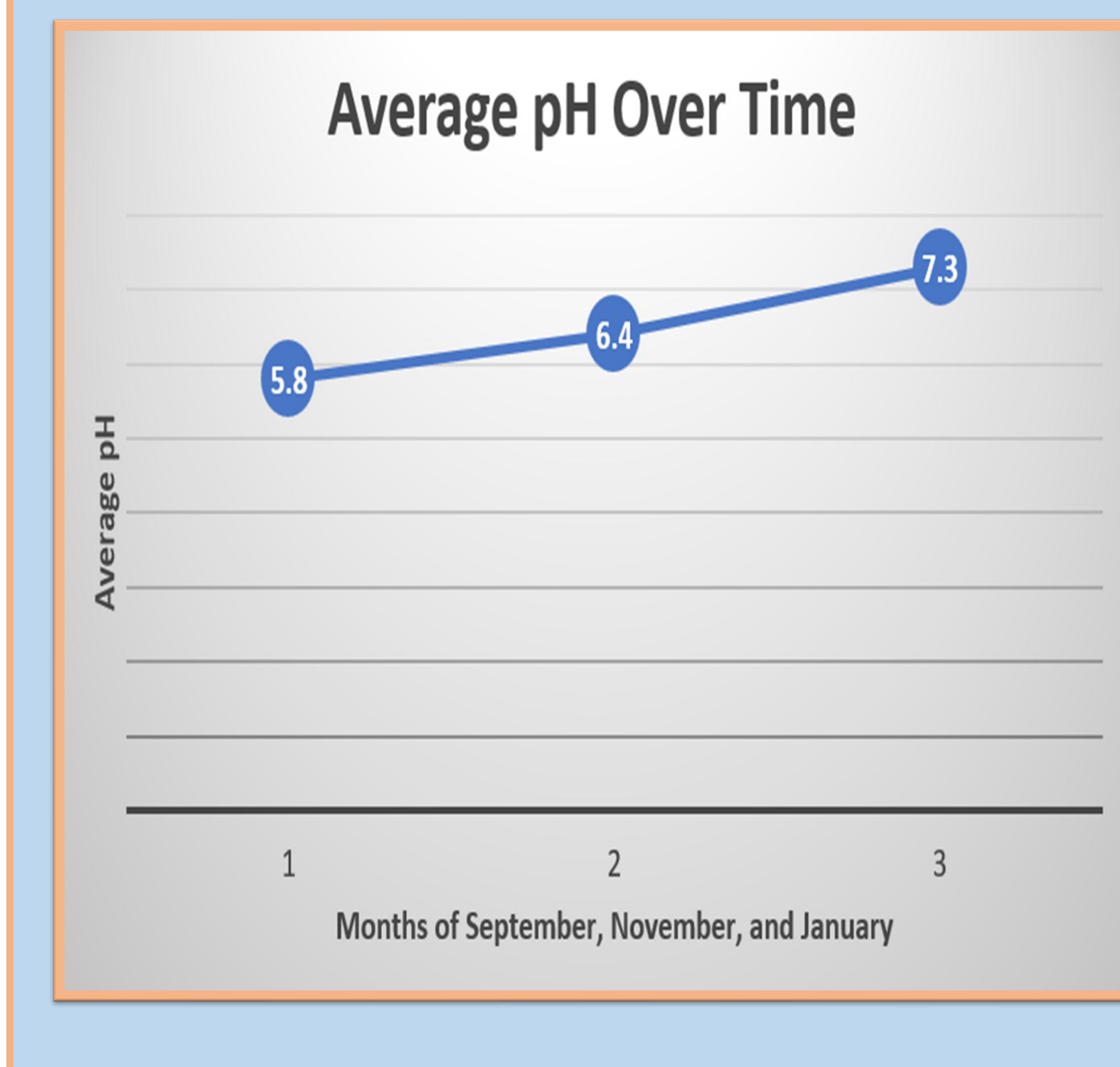


Figure 1. Each data point on this chart represents the average pH observed every two months, specifically September, November, and January in that order.

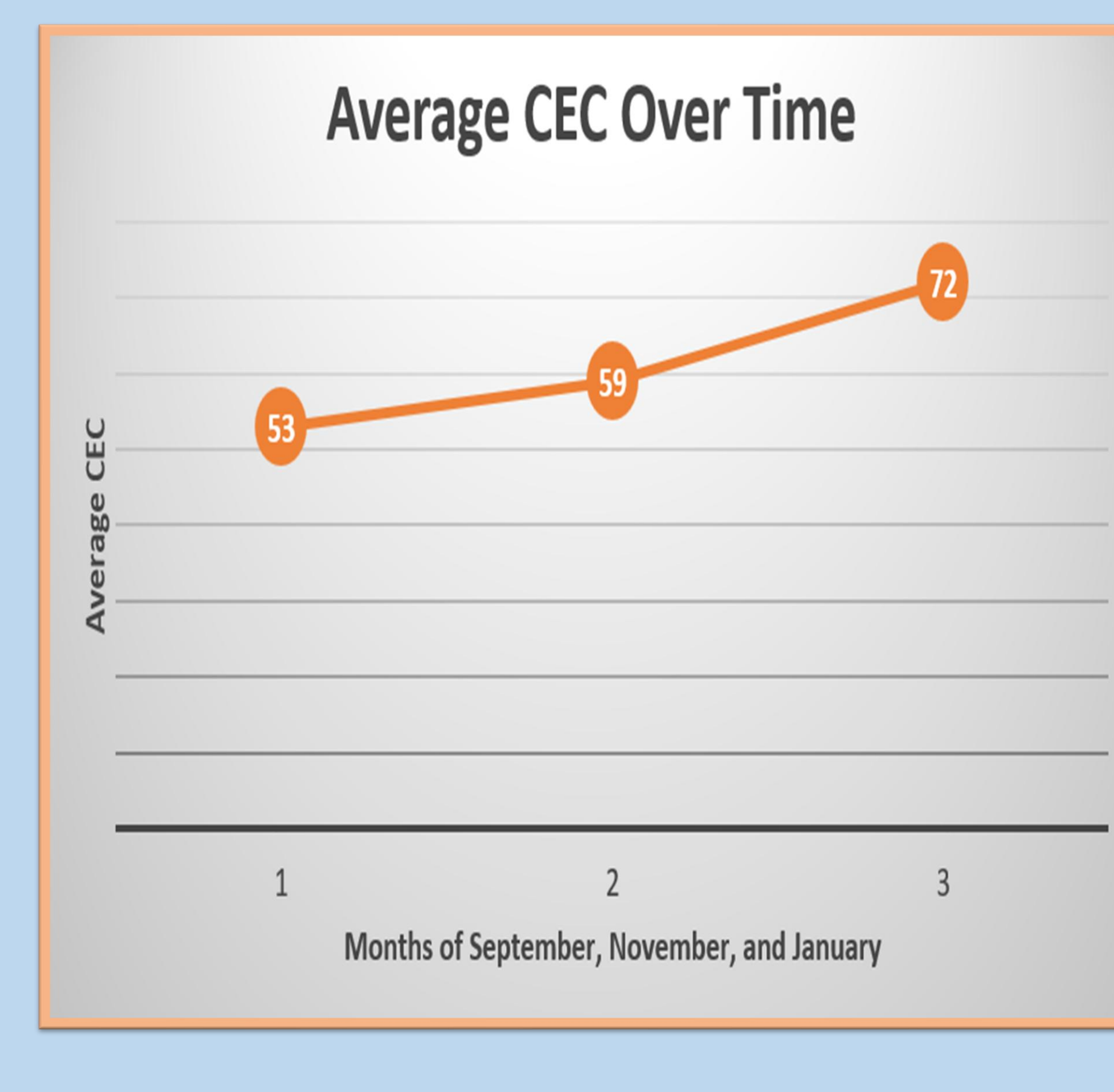


Figure 2. Each data point shown represents the average Cation Exchange Capacity observed every two months, specifically September, November, and January in that order.

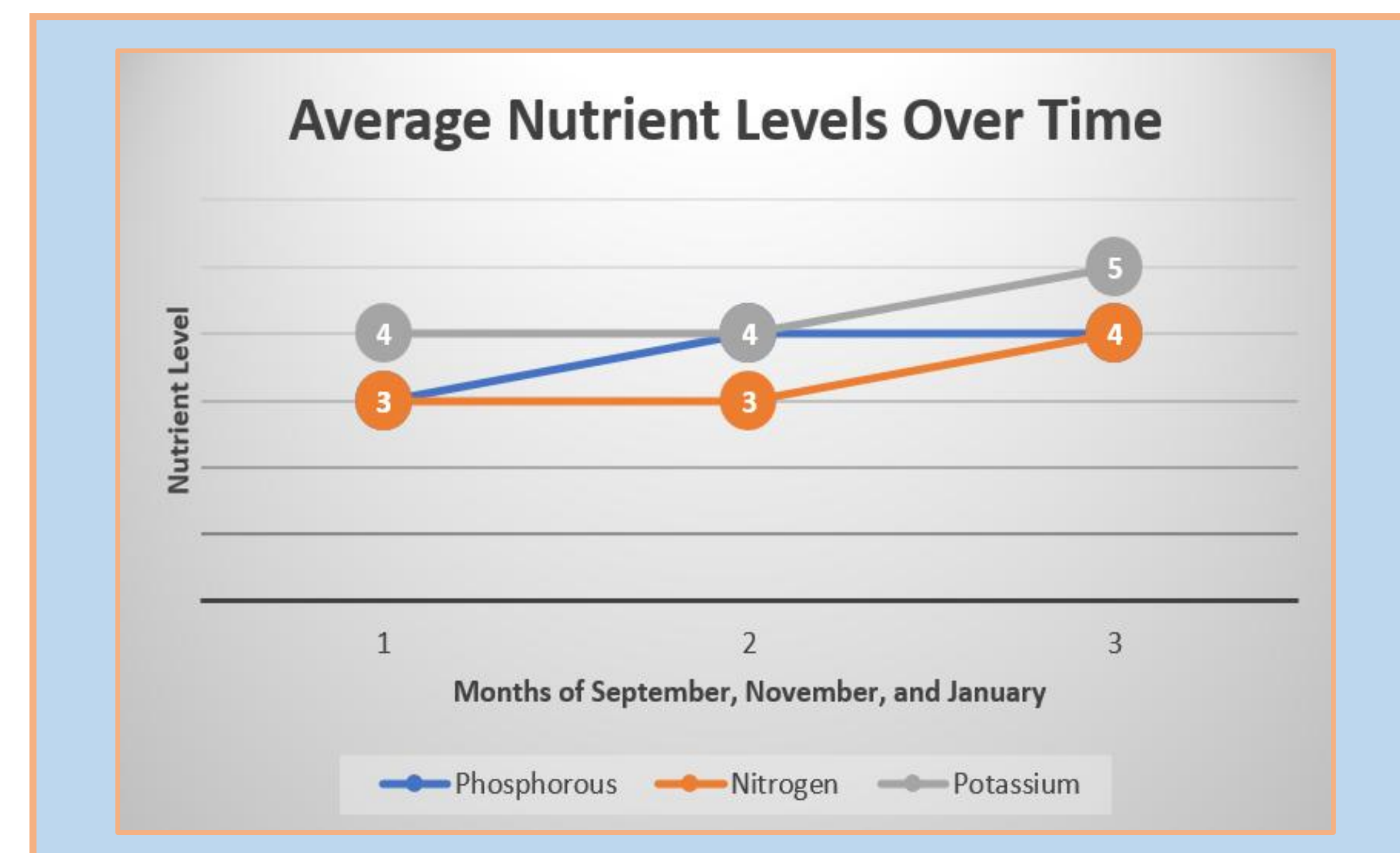


Figure 3 Each data point on this chart represents the level of each nutrient taken every 2 months, specifically September, November, and January in that order. The soil's Phosphorous, Nitrogen, and Potassium levels were tested on a 1-5 scale of depleted to surplus.



Figure 4. Powder Blue isopods, as used in the experiment

Conclusions

- Through the data gathered during the experiment, one can clearly observe a positive change in soil conditions, within just six months. The pH of the soil started from 5.8, a range which is on the acidic side, and ended at a 7.3, which is almost perfectly neutral.
- The CEC (Cation Exchange Capacity) started at a healthy 53, which would allow some growth, but ended at 72, which is incredibly good for substrates. The CEC is a way to measure how well soil can hold an retain nutrients, a crucial part to having a fertile soil. Our nutrient levels had a bit more variation. Nutrient levels were measured on scales of 1-5, going in order of: depleted, deficient, adequate, sufficient, and surplus. Our phosphorous started at a 3, meaning adequate, then changed to a sufficient 4 over two months, and settling at this 4. Our nitrogen was similar, starting at an adequate 3 and staying at this same level when checked on in November. In January, however, this went up to a sufficient 4. Our potassium started higher with a sufficient 4, and stayed at this 4 when data was taken in November. But, in January, the soil reached a surplus level of 5. The hypothesis was correct in assuming that having isopods in an area of soil will make it more fertile. We can see through the observed data that the soil's pH, CEC, and levels of phosphorous, nitrogen, and potassium have gone up throughout the 6 months that the isopods have been introduced into the environment, which directly supports the hypothesis.
- **Errors:** The experiment had several errors, but the most obvious is in the species of isopods used to gather data. In the experiment, it was powder blue isopods, rather than Indiana's most common terrestrial pill bug. This obviously will vary our results slightly. Along with this is their soil. The powder blue isopods had a coconut substrate and soil mix, while real Indiana soil doesn't have this substrate. These errors make this experiment less tailored to the actual natural effects of decomposers, due to the significantly more controlled environment and the various factors changed for quality of life. As it is, this experiment is heavily flawed variable wise, to allow for the isopods to have proper care. If this experiment were to go
- **Further Research:** Isopods would be changed. This would include using terrestrial pill bugs, putting them in Indiana soil taken from outside, and giving them food that's in their natural habitat. Another way to further develop this experiment could be to test this was other decomposers, to find which animals create the best soil conditions. This experiment is extremely important to our state, especially in our current times. Farming states such as ours are being ravished by climate change and AI data centers, which is not only wrecking our economies, but making life harder and harder on the common person. By finding ways to keep our soil healthy, even ways as simple as bugs, it can make a huge positive change in our local community.

References

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