ECOLOGICAL SUCCESSION OF POND WATER

**PURPOSE:** How do populations in pond water change over time?

**Background:** Over time, an ecosystem goes through a series of changes known as ecological succession. The changes happen within the structure of a community and usually are caused by the community itself. During ecological succession, organisms often change their environment in such a way that the types of organisms that can thrive in the environment changes. Abiotic factors also play a role in ecological succession. Temperature, amounts of rainfall and light, geological features, and other abiotic factors may change. These changes may produce biotic changes. As ecological succession occurs, a stable climax community is eventually established. Most examples of ecological succession must be studied over a period of many years because it takes a long time for ecological succession to occur in the environment. In this investigation, you will study ecological succession on a smaller scale by observing pond water cultures over a period of a few weeks. You will also devise your own experiment to see how a particular independent variable affects the process of succession in pond water.

**MATERIALS:**

|  |  |  |
| --- | --- | --- |
| pond water sample  | glass slides | pond water guides |
| pipettes  | cover slips  | pH strips |
| 2 test tubes  | microscope  |  |

Also, students may choose from the following materials (or other suitable materials) to use as the independent variable in their experiment:

1. Foil to block light
2. Sand or gravel to add as a substrate at the bottom of the tube
3. Fertilizer pellets to add nutrients to the sample
4. Etc.

**PROCEDURE:**

1. Gather some pond water in your two test tubes. Be sure to make every effort to ensure that both samples are as similar as possible.
2. Decide on a specific question you want to answer and decide on what your independent variable will be. Make one of your tubes the experimental group and manipulate it so that you can answer your question.
3. Use masking tape to label each tube with your period, names and whether it is the experimental or control group.
4. Observe both samples for color, turbidity (cloudiness), odor, any layering of materials that may occur, and any other observations. Record the date of your observations in your data table.
5. Make at least 3 wet mount slides of your pond water sample. Take the sample for each slide at a different depth (one from the top, one from the middle and one from the bottom) in your bottle.
6. Examine each slide under a microscope, first under low power, then under high power. Identify and sketch all organisms in your sample by using the Pond Water Guide Book and try to get a population count of each different type. Enter your data in the Data Table.
7. Use the pH paper to test the pH of your pond water sample and enter this in your Data Table.
8. Repeat steps 4-7 once per week until the end of the lab.
9. Construct a line graph of any 3 organisms of your choice using your population counts.

**DATA/OBSERVATIONS:**

**Organism Sketches:**

**Data Tables:**

Observations, pH and Organism Counts for the Control Group Sample

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Date | Qualitative Observations | pH |  | Species or Taxa Present | Number Counted |
|  |  |  |  |  |  |
|  |  |  |
|  |  |  |  |  |  |
|  |  |  |

Observations, pH and Organism Counts for the Experimental\*\* Group Sample

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Date | Qualitative Observations | pH |  | Species or Taxa Present | Number Counted |
|  |  |  |  |  |  |
|  |  |  |
|  |  |  |  |  |  |
|  |  |  |

\*\* Be sure to note what change you made to the experimental group sample in the title!

**QUESTIONS (full sentence answers):**

 1. What organisms were abundant in your pond water cultures at the start?

 2. What organisms increased in population in each sample?

 3. What organisms decreased in population in each sample?

 4. Compare and contrast your two samples. How did the independent variable affect the process of succession?

 5. Was there a relationship between pH and the number of populations present in your pond water sample?

 6. What would you consider to be the climax community in your pond water samples, if any? Explain.

 7. List the abiotic factors at work on your sample.

8. Make a hypothesis for why you observed the changes that you observed. If you did not observe any changes, hypothesize why no changes were observed.

**DISCUSSION:** Discuss how this lab can relate to aquatic systems in the

 real world.

**CONCLUSION:** *Write a paragraph describing the meaning and significance of your results. Was your hypothesis supported or refuted? Are there any variables that could not be controlled? What improvements could be made to the experiment? What questions remain unanswered? Explain, explain, explain!*

**Lab write up format for this lab:**

Title

1. Question
2. Hypothesis
3. Variables
4. Independent Variable
5. Dependent Variable
6. Controlled Variables
7. Materials
8. Procedure
9. Identify Control group
10. Identify Experimental group
11. Write out the EXACT steps you will perform!
12. Data Table(s) and Observations

Must be clearly TITLED, LABELED, and FILLED IN. Must include UNITS!

Write down any qualitative observations you make!

1. Data Analysis

Present your results and analyze them. Use a graph to show the results. Perform any necessary calculations and explain them.

1. Questions (1-8)
2. Conclusion

Write a paragraph describing the meaning and significance of your results. Was your hypothesis supported or refuted? Are there any variables that could not be controlled? What improvements could be made to the experiment? What questions remain unanswered? Explain, explain, explain!