**Pesticides, Fertilizers and Macroinvertebrates-Does the Introduction of Pesticides and Fertilizers Alter an Aquatic Ecosystem?**

**Objectives:**
Students will be able to:

* determine if the introduction of pesticides and fertilizers can change the water quality of an ecosystem.
* evaluate how the introduction of pesticides and fertilizers can change an aquatic ecosystem in a simulated system.

**Materials:**
Water sample from a local stream or pond (sample must be fresh and contain debris from the
bottom and edges of the water)
Macroinvertebrate Identification charts
Small beakers or jars to set up miniature water ecosystems
Dissecting microscope and hand lenses
5% fertilizer solution in dropper bottles
5% pesticide solution in dropper bottles
pH paper or pH probe
Pipettes

**Note:** Aeration of the samples is preferable during the 24 hour period, because of the
susceptibility of some of the aquatic organisms to environmental changes. The organisms
which are the most susceptible are the ones which are intolerant to pollution. As the
dissolved oxygen levels decrease, the organisms will rapidly die off. The dissolved oxygen
levels begin to decrease almost immediately after the sample is taken from the water.

**Note:** Safety goggles and aprons should be worn at all times during this lab activity.

**Procedure:**
1. Working with a partner, take an approximate 1000 ml sample of the water including the debris.
2. Pour a portion of the sample into a petri dish and examine it under low power on the microscope
or with a hand lens.
3. Using the identification charts, identify the predominant species of macroinvertebrate and
determine the pH level of the sample.
4. Once an identification has been made and the pH has been determined, separate the 1000 ml
sample into five 200 ml samples in separate containers. Label each container in the following manner
and add the listed amounts of fertilizer and pesticide solution to the properly labeled container.

* -Container 1- 5 drops of 5% fertilizer solution
* -Container 2- 20 drops of 5% fertilizer solution
* -Container 3- 5 drops of 5% pesticide solution
* -Container 4- 20 drops of 5% pesticide solution
* -Container 5- control

5. Do not add anything to container 5. This is the control.
6. Place containers in a location where they will not be disturbed for a 24 hour period.
7. Hypothesize about how the contents of each container will change after the 24 hour period. In
your hypothesis include a statement about pH.

**Hypothesis:**

**Results:**
After the 24 hour period, observe the contents of each container. Record your observations in the
data table. Determine the pH of each container and record the number in the data table.

**Data Table:**

|  |  |  |  |
| --- | --- | --- | --- |
| Containers | Additions to containers | pH | Observations  |
| 1 | 5 drops of 5% fertilizer solution  | 1. | 1.  |
| 2 | 20 drops of 5% fertilizer solution  | 2. | 2. |
| 3 | 5 drops of 5% pesticide solution  | 3. | 3. |
| 4 | 20 drops of 5% pesticide solution  | 4. | 4. |
| 5-control  | No additions   | 5. | 5. |

After the observations are complete, answer the following questions.

**Conclusions:**
1. Does the data collected support your hypothesis? Explain.

2. Based on your observations, in which container was the survival rate of macroinvertebrates the
highest? Why?

3. Based on your observations, does the addition of pesticides and fertilizers to an ecosystem cause a disruption in the ecosystem? If it is disrupted, how is it disrupted?

4. What are some possible causes for an increase in the fertilizer or pesticide levels in an aquatic ecosystem?

5. What other factors may have had an effect on the changes of your aquatic systems?