

**Environmental Sciences 101**  
**Lab 3a: Radish Growth**

July 5, 2005

The objective of Lab 3 is to improve our understanding of the correlation between the abiotic environment and the presence of biodiversity.

Lab 3a identifies this correlation for a single plant under lab controlled conditions. We will study the effect of varying abiotic conditions on the growth of a single plant: radish. Some potted radish seedlings have been provided to you. These were planted in the first week of this term under varying abiotic conditions as indicated below. Note that the appearance and the number of seedlings sprouted vary from one pot to another. There is also a 'control' provided that was grown under standard conditions.

Your assignment is as follows:

1. Each group is to select one of the pots as indicated below. *Before* picking up your pot, you are to note which sample is assigned to you and hypothesize what you expect the growth of the seedlings to be like, i.e. Do you expect the seedlings of your assigned pot be the same in appearance to the Control--why or why not?

Example:

Condition: Seeds were given no water

Hypothesis No growth is expected.

Reason: Water is absolutely essential for a seed to germinate. It transports nutrients from the soil to the seed and if there is inadequate water a seed would start to germinate but then dry out and die. A large percentage of a living cell (which is the structural and functional unit of life) is made up of water and hence the latter is essential for the growth of any organism.

Group 1	Proper soil + <b>no fertilizer</b> + adequate water+ adequate light+ adequate warmth
Group 2	Proper soil + fertilizer+ <b>inadequate water</b> + adequate light+ adequate warmth
Group 3	Proper soil + fertilizer+ adequate water+ <b>inadequate light</b> + adequate warmth
Group 4	<b>Poor soil</b> + fertilizer+ adequate water+ adequate light+ adequate warmth
Group 5	Proper soil + fertilizer+ <b>Excess water</b> + adequate light+ adequate warmth
All groups use this for comparison	<b>Control</b> : Proper soil + fertilizer+ adequate water+ adequate light+ adequate warmth

2. Now pick up the sample assigned to your group. Compare it visually to the seedlings grown in the 'Control pot' and make a qualitative analysis.

Answer the following questions:

- The growth of the seedlings under standard conditions is considered healthy normal growth. Do the seedlings in your pot appear equally healthy?
- What are the differences you noted, if any? (Example, is the height different, are the leaves smaller, etc.). Why do the differences exist? (If this answer is similar to what you

wrote in Question 1, just mention, 'same as Question 1'. You do not need to write it again.)

- Do the results agree or disagree with your hypothesis? Explain. I will not be deducting points if your expectations are different from your observations so do not change your answers after looking at the seedlings.
- What is the standing stock for the control and your seedlings? Standing stock is defined as 'number of organisms/per unit area'. All pots have the same area so you can consider each pot to be an unit area, i.e. the number of seedlings is the standing stock in this case.
- Comment on how this experiment has contributed to your understanding a relationship between abiotic environment and the occurrence of biodiversity. Do you think agricultural land is highly productive in comparison to other ecosystems? Why?

**3.** Pick out at least 4 seedlings from the sample that you have and 2 seedlings from the control. Keep them separate. Try to dig in deep enough so that the root remains intact. Brush off as much soil as possible without damaging the root. Take them over to the second floor lab and weigh them. Record the weights and determine the average of the control and your samples separately. This is your fresh weight.

**4.** Now with the scapula provided, cut the seedling into roots, stem and leaves. Put them on the given tray and for your own convenience, label them. They shall be placed in an oven to dry and will be further analyzed on 7<sup>th</sup> July.

**5.** Discuss the results in class.