

Part II: Experimental Design

1. A **variable** is something that you change in an experiment. What is your variable?
2. In order to understand the effects of your variable, all the other conditions should be exactly the same. These conditions are held **constant**. Why is it important to have conditions held constant?
3. Fill in the table to show which conditions you are going to hold constant and which you are going to vary. For the constants show what you will do.

Characteristic	Example Experiment		Your Experiment	
	Constant or variable?	What will you do?	Constant or variable?	What will you do?
Light	<i>constant</i>	<i>window sill</i>		
Water	<i>constant</i>	<i>keep soil damp</i>		
Salt	<i>constant</i>	<i>no salt</i>		
Fertilizer	<i>constant</i>	<i>3 pieces per pot</i>		
Soil	VARIABLE	VARIABLE		
Temperature	<i>constant</i>	<i>room temperature</i>		
other				

4. Your hypothesis.
A hypothesis is a possible explanation or an educated guess about what you will find. It is a starting point for your experiment.

How do you think your variable will affect rice plants?

Example hypothesis:

I expect that soil will cause the plants to grow because they need a place to put their roots.

Too much soil will lead the plants to not grow because they won't be able to get out of the soil to the light.

Not enough soil will lead the plants to not grow because they won't have a place to put their roots or a way to take in water.

Your hypothesis:

I expect that _____ will cause the plants to _____ because _____.

Too much _____ will lead the plants to _____ because _____.

Not enough _____ will lead the plants to _____ because _____.

5. Controls and treatments.

To see the effect of your variable, you must compare it against a **control**.

5a. For your variable, what do you think is the “best practice” for your variable? This will be your control.

Example control:

Rice plants will grow best when soil is present and not packed down.

Your control:

Rice plants will grow best when _____ is _____.

5b. What are your treatments?

Example treatments:

To understand the importance of soil, I will compare my control to

1) seeds in a pot with no soil, and

2) seeds in a pot with twice as much soil as my control, packed down.

Your treatments:

To understand the importance of _____, I will compare my control to

1) _____, and

2) _____.

6. What supplies will you need? How will you get any that are not already available in the classroom?

7. How will you measure your results?

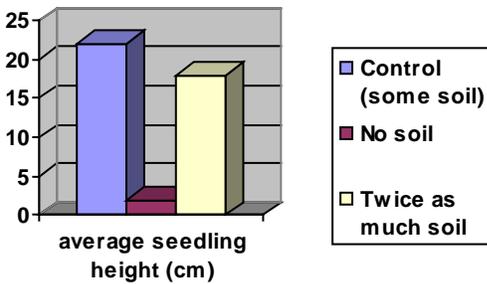
8. What will you need to do every day?

Part III: Data and results

1. Use this space to record your data:

Plant	Control:	Treatment 1:	Treatment 2:
1.			
2.			
3.			
4.			
Total			
Average			

2. Graph your data.



Part IV: Your Conclusions

3. What does this experiment tell you about the importance of your variable? (What did you learn from your experiment?)

4. Did you have any unexpected results? What were they and why do you think they happened?

5. How could you improve your experiment? (Are there ways your experiment could be improved to better answer the initial question? Did you come up with questions you can't answer using your data?)

Part V: What do rice plants need in order to grow? (Learning from each other)

Each group will give a 3 minute presentation describing 1) what their experiment told them what rice plants need to grow and 2) making a recommendation of the “best practice” for their variable. You will need to answer the questions below (by taking notes!)

1. What does this experiment tell you about the importance of each variable for rice plants?

Variable	Importance	“Best Practice”
Light		
Water		
Salt		
Fertilizer		
Soil (<i>Example</i>)	<i>Plants need soil for their roots. When rice plants have no soil, they die. When the soil is dense, rice plants grow more slowly.</i>	<i>Use soil. Don't compact it.</i>
Temperature		

