Background Research Plan Worksheet

Name: Sofija Ikavcesh

1. What is the **question** you are going try to answer with an experiment? My testable question is, How does acid rain effect plant growth?.

2. List the **keywords** and phrases from your question and the topic in general. (Hint: Use an encyclopedia to help you)

Acid	Plants	Plant growth	PH
Rain	Plant growth	pH	Sun water
Acid Rain	effects	Alkaline	Water

3. Now use your keywords to build some **questions to guide your background research**. Develop at least two or three from each "question word." Don't worry about whether you already know the answer to the question—you'll find the answers when you do your background research. And don't forget to "network" with knowledgeable adults who can help guide you toward good materials!

Question Word	Possible Questions (you can think of others)	Substitute your keywords (or variations of your keywords) for the blanks in the previous column. Write down the relevant questions and use them to guide your background research.
Why	Why does Acid rain happen? Why does ____ ____? Why did acid rain become a problem?	Is there a reason for Acid rain? Why is it a problem?
How	How does ____happen? How does rain work? How does one detect when acid rain falls? How does one measure ____? How do we use ____? How did acid rain start?	How does Acid rain work? Is there a way to detect When Acid rain falls? How did Acid rain first form?

Question Word	Possible Questions (you can think of others)	Substitute your keywords (or variations of your keywords) for the blanks in the previous column. Write down the relevant questions and use them to guide your background research.
Who	Who needs _____? Who discovered Acid rain? Who invented _____? Who has measured acidity in rain?	Who discovered Acid rain? has anyone measured the Acidity of Acid rain?
What	What causes _____ to increase/decrease? What is Acid rain made of? What are the characteristics of _____? What is the relationship between _____ and _____? What do we use _____ for? What causes Acid rain?	What makes up Acid rain? What causes Acid rain?
When	When does _____ cause _____? When was Acid rain discovered? When did acid rain first fall?	when did we discover acid rain? When did Acid rain first fall?
Where	Where does _____ occur? Where does _____ get used? Where does acid rain mainly occur?	Where did acid rain fall originally? Where does it mainly occur

4. To analyze the results from experiments you might need to know some **key formulas or equations**. Think about your own experiment and write down any step or task that requires a formula or equation. Don't worry about whether you already know what the formula or equation is—you'll find the actual equation when you do your background research.

   List steps or tasks that may require a formula or equation:

_____ _____ _____ _____

_____ _____ _____ _____

Sofija

Science Fair Projects

Every student in the RTA Science Program is expected to complete a project to share in our Celebration of Learning or Science Fair. In an effort to encourage students to contribute to original research, we would like all projects to be experimental or innovation.

1. Experimental projects: These projects involve testing a hypothesis under controlled conditions using the scientific method. As the researcher, you control several variables, manipulate one variable in a controlled way, and then measure, record and analyze the responding variable, to reach your conclusion.

2. Innovation projects: These projects focus on the development and evaluation of innovative devices, models or techniques in technology, engineering or computers. As the researcher, you should demonstrate an understanding of the properties of the materials/methods used, the reasons for choosing them, and the effectiveness of your design. You should test your innovation and modify it if you discover shortcomings during testing.

Visit the website for the Calgary Youth Science Fair: www.cysf.org. This website has a lot of information that will help you choose a project, stay organized and follow the rules.

All of your work MUST BE RECORDED IN A LOG BOOK. (notebook, binder or digital) This includes dates, research ideas, plans and results.
(See Planning Calendar)

TIMELINE

Brainstorm	- Start a log book! - Review various resources (books, magazines, websites) to get ideas for your project. Write your initial ideas in your log book. Choose a topic	Date Due September 19	Completed ✓

Write a proposal	- Your proposal must be approved by your science teacher then signed by a parent or guardian! - Includes: Topic(s), Title*, Question, Hypothesis, Research Plan and Sources of Information.	Oct 9, 2023	✓
Complete Background Research	- Typed as a written report (guidelines shared in class and online)	Nov 1 not 3	✓
Make a plan	- Write Procedure/Plan for your experiment/ innovation	Nov 22 2023	✓
Get started! ****WORK AT HOME	- Start when your teacher has approved your procedure/plan. - Perform your experiments/ create your innovation. - Perform multiple trials/make revisions to your design. - Record observations	Started: Nov 30/23 Finished. DEC 21/23	✓
What happened & Who cares?	- Data analysis - Conclusions, etc.		✓
Prepare a tri-fold	- Write a conclusion - Layout & design of an appealing and informative display Layout due Jan 18 - Follow through with layout plan		✓
Write & practice a strong presentation	- Practice presenting your data. - Practice answering questions.		✓
Present your work	- Present your project at the school science fair.	Jan 26/24	

Important Science Fair Information:

1. You *really* should work alone (Will you be allowed to go to your partner's house to do the experiment? Depends on the health regulations when we get to that stage. It's just safer to do your project solo).

2. Each individual will be responsible for making a project log book where all information is recorded as well as a project display (possibly even a trifold this year!).

3. Much of the science fair work will be done at home with certain in-class work periods throughout the timeline. It is your responsibility to stay on track to ensure your project is complete by the due date.

4. You should use various sources (internet, books, magazines, etc.) for background research and information. Make sure to record all resources used and ensure that all information is IN YOUR OWN WORDS.

5. When performing your experiment, complete AT LEAST three trials to ensure your results are accurate. Be sure to discuss any sources of error or problems that occurred which may have affected your results.

6. Take pictures (if possible) when you are completing your experiment. They will be useful when creating your experiment tri-fold.

7. We will discuss how to set-up the display board and how to present your project during the work periods.

How to provide the reference for a web page

Write the following:

- State what the reference is for (a picture, information, etc.)
- The author's name (if you know it).
- The title of the article (if there is one).
- The web address
- The date you went to the site.

Example:

Research information:
Dowdy, B. The endangered cougar. www.cougar.edu/justanexample May 12, 2014

Pictures:
1. The Canadian Cougar. www.cougarinfo.gov/notarealsite September 30, 2014
2. www.cougarpics.org/anotherexample September 25, 2014

Science Fair Proposal

Student name(s): Sofija + Kavesh

Experiment or Innovation: (Check the CYSF website)

Experimental Project

Topic(s): Botany, Conservation, Environmental science, Pollution, life science.

Project Title (be creative) – (Can be added later)

Sour showers: unveiling its effects on plants

Project Question (What problem are you going to solve?):

How does acid rain effect plant growth?

Hypothesis based on your project question (If...then...because...):

If we water 3 arugula plants and 3 green onions with different acid rain simulating solutions, then the most acidic solution will slow the plant growth the most because Acid rain makes soil poor and loses nutrients effecting optimum plant growth.

Variables (for experimental project only):

Manipulated variable: The type of plant and the acidity in water, normal distilled water, pH=4.0, pH=2.5

Responding variable: The growth + changes in the plants

Three (or more) controlled variables: Same amount of soil, amount of water, when watered, same sized pot for each plant, time span

Required materials:

- 4 green onion roots - 4 arugula seeds - 8 of the same sized pots
- Vinegar or Sulphuric acid - distilled water - Soil - Scale
- 8 spray bottles - Ph strips - Safety gloves - baking soda
- Safety goggles - measuring cups - tape - Sharpie

Safety/ Ethics considerations: *reviewed in class

- We are wearing safety equipment, goggles + gloves
-

Background Information:

- Attached to this proposal (or written in your log book).
- **Point-form** research notes
- Two paragraphs in your own words.
- **References** (citations) attached to this proposal.
- May include books, magazines and/or websites.

Things to consider:

Can you find at least three sources of information on the subject?	Yes/No
Is your experiment safe to perform (for yourself and others)?	Yes/No
Will you be able to get all the materials/equipment you need ?	Yes/No
Do you have enough time to do your experiment more than once?	Yes/No
Did you contact an expert in the field?	Yes/No

I have discussed the project idea and the checklist with my parent/guardian and I am willing to commit to following through on this project.

Sofija Pocinovic _____ Oct 16, 2023 _____

Student Signature Date

I have discussed the project idea and the checklist with my child and I believe s/he can follow through with this project. I will support them, as needed, in the completion of this project. I understand that while parents can support their child in completing the project, the student is

expected to do the work themselves and learn from their mistakes as part of the scientific process.

Parent Signature

Oct. 16/23

Date

kaveesh

Science Fair Projects

Every student in the RTA Science Program is expected to complete a project to share in our Celebration of Learning or Science Fair. In an effort to encourage students to contribute to original research, we would like all projects to be experimental or innovation.

1. Experimental projects: These projects involve testing a hypothesis under controlled conditions using the scientific method. As the researcher, you control several variables, manipulate one variable in a controlled way, and then measure, record and analyze the responding variable, to reach your conclusion.

2. Innovation projects: These projects focus on the development and evaluation of innovative devices, models or techniques in technology, engineering or computers. As the researcher, you should demonstrate an understanding of the properties of the materials/methods used, the reasons for choosing them, and the effectiveness of your design. You should test your innovation and modify it if you discover shortcomings during testing.

Visit the website for the Calgary Youth Science Fair: www.cysf.org. This website has a lot of information that will help you choose a project, stay organized and follow the rules.

All of your work MUST BE RECORDED IN A LOG BOOK. (notebook, binder or digital) This includes dates, research ideas, plans and results.
(See Planning Calendar)

TIMELINE

Brainstorm	- Start a log book! - Review various resources (books, magazines, websites) to get ideas for your project. Write your initial ideas in your log book. Choose a topic	Date Due September 19	Completed 

Write a proposal	- Your proposal must be approved by your science teacher then signed by a parent or guardian! - Includes: Topic(s), Title*, Question, Hypothesis, Research Plan and Sources of Information.	Oct 9, 2023	✓
Complete Background Research	- Typed as a written report (guidelines shared in class and online)	Nov 1 2023	✓
Make a plan	- Write Procedure/Plan for your experiment/ innovation	Nov 22 2023	✓
Get started! ****WORK AT HOME	- Start when your teacher has approved your procedure/plan. - Perform your experiments/ create your innovation. - Perform multiple trials/make revisions to your design. - Record observations	Started: Nov 30/23 Finished: Dec 21/24	✓
What happened & Who cares?	- Data analysis - Conclusions, etc.		✓
Prepare a tri-fold	- Write a conclusion - Layout & design of an appealing and informative display Layout due Jan 18 - Follow through with layout plan		✓
Write & practice a strong presentation	- Practice presenting your data. - Practice answering questions.		✓
Present your work	- Present your project at the school science fair.		

Important Science Fair Information:

1. You *really* should work alone (Will you be allowed to go to your partner's house to do the experiment? Depends on the health regulations when we get to that stage. It's just safer to do your project solo).

2. Each individual will be responsible for making a project log book where all information is recorded as well as a project display (possibly even a trifold this year!).

3. Much of the science fair work will be done at home with certain in-class work periods throughout the timeline. It is your responsibility to stay on track to ensure your project is complete by the due date.

4. You should use various sources (internet, books, magazines, etc.) for background research and information. Make sure to record all resources used and ensure that all information is IN YOUR OWN WORDS.

5. When performing your experiment, complete AT LEAST three trials to ensure your results are accurate. Be sure to discuss any sources of error or problems that occurred which may have affected your results.

6. Take pictures (if possible) when you are completing your experiment. They will be useful when creating your experiment tri-fold.

7. We will discuss how to set-up the display board and how to present your project during the work periods.

How to provide the reference for a web page

Write the following:

- State what the reference is for (a picture, information, etc.)
- The author's name (if you know it).
- The title of the article (if there is one).
- The web address
- The date you went to the site.

Example:

Research information:
Dowdy, B. The endangered cougar. www.cougar.edu/justanexample May 12, 2014

Pictures:
1. The Canadian Cougar. www.cougarinfo.gov/notarealsite September 30, 2014
2. www.cougarpics.org/anotherexample September 25, 2014

Science Fair Proposal

Student name(s): Kaveesh & Sofija

Experiment or Innovation: (Check the CYSF website)

Experimental Project

Topic(s): Botany, Conservation, Enviormental Science, Pollution, Life Science

Project Title (be creative) – (Can be added later)

Sour Showers- unveiling its effects on plants

Project Question (What problem are you going to solve?):

How does acid rain affect plant growth?

Hypothesis based on your project question (If...then...because...):

If we water 3 arugula plants and 3 green onions with different acid rain solutions, then the most acidic solution will slow the plant growth the most because acidic rain makes soil poor and less nutritions affecting optimum plant growth

Variables (for experimental project only):

Manipulated variable: The Acidity of the water

Responding variable: The growth and changes in the plant

Three (or more) controlled variables: The type of plant, time watered, amount watered, soil, container/pot, timespan

Required materials:
-4 green onion root - 4 arugala seeds - 8 of the same sized pots - ph strips - Sulfric Acid - Baking Soda - 8 spray bottles - Measuring cups - Scale - A ruler - Permanent marker - Tape - Safety goggles - Gloves

Safety/ Ethics considerations: *reviewed in class
- Wear PPE (goggles and gloves)

Background Information:

- Attached to this proposal (or written in your log book).
- **Point-form** research notes
- Two paragraphs in your own words.
- **References** (citations) attached to this proposal.
- May include books, magazines and/or websites.

Things to consider:

Can you find at least three sources of information on the subject?	Yes/No
Is your experiment safe to perform (for yourself and others)?	Yes/No
Will you be able to get all the materials/equipment you need ?	Yes/No
Do you have enough time to do your experiment more than once?	Yes/No
Did you contact an expert in the field?	Yes/No

I have discussed the project idea and the checklist with my parent/guardian and I am willing to commit to following through on this project.

KAVEESHA — Nov 15, 2023.

Student Signature — Date

I have discussed the project idea and the checklist with my child and I believe s/he can follow through with this project. I will support them, as needed, in the completion of this project. I understand that while parents can support their child in completing the project, the student is

expected to do the work themselves and learn from their mistakes as part of the scientific process.

Parent Signature

Date NOV 15, 2023

Sofija And Kaveesh's Acid Rain Background Research

A tremendous problem that has been extremely prominent in the past few years is acid rain. Even though the pH of acid rain hasn't reached the pH of 2.1 as the scientists recorded in the 1970s and 1980s, it is still horrible for the environment (Willyard, 2010). Acid rain can also be known as acidic deposition and comes in many forms of precipitation including acidic components like snow, rain, hail, fog, sleet etcetera (EPA, 2023). Sulfuric and/or nitric acid are the two main components that make precipitation acidic as it also mixes with other things that are biotic or abiotic before reaching the ground (EPA, 2023). Our experiment is testing different acidities of water (the average acidity of acid rain is 4pH and the worst it has gotten is 2pH) on 2 different types of vegetables. Doing this will help us realize how it affects them individually and then use our data to see how it would help on a real-world scale. If we water 3 arugula plants and 3 green onions with different acid rain simulating solutions, then the most acidic solution will slow the plant growth the most because acid rain makes the soil poor and less nutritious affecting optimum plant growth.

Acid Rain can have different effects on different plants, but one main effect is slowing plant growth. One of the things acid rain affects the most is the soil. When acidic rain falls on the soil it makes it poor and less nutritious for plants (Amthor, 1984). Acid Rain acidifies the soil and releases aluminum contents which are toxic in large amounts (EPA 2023 #2). Aluminum causes toxicity and damages roots in all kinds of vegetation (Northern Tool). And with damaged roots plants have a much harder time surviving. On top of that, acid rain also leaches nutrients and minerals from the soil that are crucial for growing plants. For this reason, there are many fallen/dead trees where acid rain has fallen. On plants with leaves acid rain takes nutrients away from those leaves and leaves a plant unable to perform photosynthesis (EPA 2023 #2). So, in conclusion, acid rain damages and slows the growth of plants.

Identifiable by the name, acid rain is when the rain becomes acidic or contains acid and gasses (Ruff, 2023). When the pH of our rain falls below 5.6, it is now considered acid rain and that is because, trapped inside the rain are the gasses that we have emitted into the environment (Ruff, 2023). The pH of things lets us know if they are acidic or basic/alkaline when placing them on the pH scale where 7.0 is neutral (EPA, 2023). Since 7.0 is neutral on the pH scale, anything lower than that is considered acidic and anything ranked higher is considered basic/alkaline (EPA, 2023). Rain is normally at a 5.6 because it's slightly acidic from the CO2 that dissolved into the rain which creates a weak carbonic acid (EPA, 2023). A way of measuring pH is using colour-changing litmus strips, when in liquid it will turn blue if alkaline and red if acidic (EPA, 2023 #3). Using a pH scale and identifying the pH of our rain helps us know if it is damaging to our vast environment.

As seen in the other paragraphs acid rain is very bad for the environment, but it can be limited a lot. Acid rain is caused by releasing sulphur dioxide and nitrogen oxides into the atmosphere (NHDES, 2019). The main problem is when those chemicals react with other chemicals including water and oxygen. This reaction creates what we know as acid rain (NHDES, 2019). Chemicals like sulphur dioxide are pollutants that are mainly emitted by Electrical Facilities, mostly by those that burn coal. Other sources include petroleum refineries, cement manufacturing plants, and processing facilities (WDHS, 2022). By limiting coal burned, the amount of sulphur dioxide in the atmosphere is limited, which also means that there would be much less acid rain. We can limit the amount of coal burned by switching, at least a little bit of our power sources to renewable energy sources like wind and solar energy (WDHS, 2022). By doing this we can limit the downfall of acid rain and save many plants.

Alkaline water evens out acidic soil and balances pH levels. Alkaline water has a higher pH than normal tap/rain water which can balance out the soil and help the plant grow. This promotes healthy growth and makes sure the plant gets the necessary nutrients that are available (phox, 2023) . On the other hand, an alkaline fluid can remove certain nutrients from the soil such as iron and manganese(ehow, 2023). Those are some of the pros and cons of Alkaline water.

Even though acid rain has been around since about 1850, which is when Robert Angus Smith coined the name Acid Rain and wrote about the connection between acid rain and pollution, it took us a little more than a hundred years to start facing this problem (Arcadia, 2017). Acid rain only fell for the first time in America in the 50s and that's when they realized the horrific problems that can arise from acid rain doing extensive research the USA put out the "Clean Air Act" in 1970 and made it stronger in 1990 (Arcadia, 2017). It started earlier in the Midwest than in America because of all the coal plants there but it spread. This is something that is hard to stop single-handedly because of the amount of the main gases emitted everywhere and a report in 2013 said that, at that time about 88% of our beloved Great Lakes were impaired by the rain (Arcadia, 2017). Just learning more about this makes it more intriguing to do our experiment on it as it will show us some of the major effects on a small scale. We're doing this experiment not just for the sake of an experiment but for sheer curiosity and interest in this problem. Hopefully, acid rain will be something we will see less and less of every year with us reducing emissions and cutting off the main pollutants. An acid rain-free world for us all.

Bibliography

- Willyard (2010) https://www.smithsonianmag.com/science-nature/acid-rain-and-our-ecosystem-20824120/#:~:text=During%20the%201970s%20and%201980s,roughly%201%2C000%20times%20more%20acidic.&text=Acid%20rain%20affected%20many%20parts,suffered%20the%20most%20ecological%20damage.
- Ruff (2023) https://www.wikihow.com/Simulate-Acid-Rain#:~:text=Fill%20a%20small%20container%20with,has%20a%20pH%20around%204.0.
- EPA (2023) https://www.epa.gov/acidrain/what-acid-rain
- Amthor (2023) https://www.sciencedirect.com/science/article/abs/pii/0143147184901934
- EPA (2023 #2) https://www.epa.gov/acidrain/effects-acid-rain#:~:text=Effects%20of%20Acid%20Rain%20on%20Plants%20and%20Trees&text=Acid%20rain%20leaches%20aluminum%20from,that%20trees%20need%20to%20grow.
- (NortherenTool) https://www.northerntool.com/learn-raised-garden-bed-safety#:~:text=Unlike%20galvanized%20steel%2C%20aluminum%20is,best%20to%20avoid%20aluminum%20altogether.
- EPA (2023 #3) https://www3.epa.gov/acidrain/education/site_students/phscale.html
- NHDES (2019) https://www.des.nh.gov/sites/g/files/ehbemt341/files/documents/2020-01/bb-8.pdf
- WDHS (2022) https://www.dhs.wisconsin.gov/chemical/sulfurdioxide.htm#:~:text=Most%20of%20the%20sulfur%20dioxide,metal%20smelting%20and%20processing%20facilities
- Arcadia (2017) https://blog.arcadia.com/15-key-facts-and-statistics-about-acid-rain/#:~:text=Acid%20rainfall%20can%20cause%20serious,occur%20due%20to%20acid%20rain.
- phox (2023) https://www.phoxwater.com/blogs/water/alkaline-water-the-benefits-for-your-plants
- ehow (2023) https://www.ehow.com/list_7776639_alkaline-water-plants.html

Sofija and Kaveesh's log book

Sept 27, 2023	We chose our topic and testable question. We also started our log book.
Oct 16, 2023	We wrote the proposal today and our parents approved. We thought of our experiment title and hypothesis.
Oct 19, 2023	We were working on our background research essay.
Oct 23, 2023	We are working on our background research essay.
Oct 25, 2023	We are working on our background research essay.
Oct 30 2023	We are finishing up our background research essay.
Nov 1 2023	We finished our background research essay.
Nov 6 2023	We started writing our project procedure.
Nov 8 2023	We finished writing our project procedure and wrote our Materials list.
Nov 15 2023	We put our variables, hypothesis and testable question on a google doc.
Nov 17 2023	We double checked everything on our docs, editing it to make sure it is completly finished.
Nov 20 2023	Getting our procedure ready to start our experiment in a couple days.
Nov 27 2023	Fixing up our project procedure because we have to substitute a material.
Nov 29 2023	finished fixing up our project procedure.
Nov 30 2023	We started our experiment today!!! Watered them 0cm 0cm 0cm photo
Dec 1 2023	No growth on each arugula plant 0cm 0cm 0cm
Dec 2 2023	No growth on each arugula plant 0cm 0cm 0cm

*measure *photos only on watering day

highest sprout previous day

Sofija & Kaveeshes log book

Dec 3 2023	Watered them. ~~7~~ Sprouted on 4ph, ~~7~~ seeds sprouted in 7ph, ~~5~~ seeds sprouted 10ph. 0.8cm ~~1~~ 1.4cm ~~1~~ 1.5cm Photo
Dec 4 2023	4ph: ~~8~~ sprouted, ~~2cm~~ all are slightly yellow or orange on sprout, shortest of all 7ph: 9 sprouts, 2.4cm, light green all have sprouted tall 10ph: 9 sprouts, 2.8, some tallest short yellow tips
Dec 5 2023	4ph: 7 sprouts, 3.3cm have a yellowish red on outer leaves, light green middle 7ph: 9 sprouts, 4cm all are same color 10ph: 10 sprouts, 4.1cm some are a little bit lighter green than others
Dec 6 2023	Watered 4ph: 9 sprouts, 4.5cm a new baby sprouts are yellow and very light, they were so small not stained 7ph: 9 sprouts, 5.5cm no discoloration at all 10ph: 11 sprouts, 4.8cm the new sprout has a dot
Dec 7 2023	4ph: 9 sprouts, 5.2cm, all stems are bent and wobbly 7ph: 9 sprouts, 5.8cm no sprouts have grown in while, still tall 10ph: 11 sprouts, 4.8, 1 sprout is small stem is thin
Dec 8 2023	4ph: 9 sprouts, 5.2cm, all have at least 1 speck of red, brown, yellow or orange 7ph: 9 sprouts, 6.5cm, only one sprout has a red speck 10ph: 11 sprouts, 4.9cm, a new sprout grew but the first one
Dec 9 2023	4ph: 10 sprouts, 5.2cm, the tips of stems slightly yellow, really bendy/wobbly 7ph: 9 sprouts, 6.5cm, they stand straight, new sprouts today 10ph: 11 sprouts, 4.9, the new sprouts yellow specks
Dec 10 2023	4ph: ~~8~~ 9 sprouts, 5.3cm 3 sprouts died, Pattor stem came out and the leaves dried up 7ph: 9 sprouts, 6.5 cm, 2 sprouts have little red dots 10ph: 11 sprouts, 4.8cm, 1 sprout is starting up
Dec 11 2023	4ph: 7 sprouts, 5.4cm, Parts of leaves look eaten off, marks or red holes on stem/leaves 7ph: 9 sprouts, 6.6cm, stem got no new sprouts, 1 dissolved 10ph: 11 sprouts, 4.9cm, 2 leaves took by ants
Dec 12 2023	4ph: 7 sprouts, 5.4cm, 1 sprout is flopping some leaves looked shriveled up 7ph: 9 sprouts 6.6cm the leaves are starting to spread apart 10ph: 10 sprouts, 4.9cm, 1 more sprout died but a new one
Dec 13 2023	4ph: 5 sprouts, 5.5cm, 2 sprouts died, stem got thinner/eaten away 7ph: 10 sprouts, 6.8, 1 sprout just grew, its leaves are yellow 10ph: 11 sprouts, 4.9, new sprouts yellow, green, red dots
Dec 14 2023	4ph: 5 sprouts, 5.5cm, brown/reddish spots on shriveled leaves 7ph: 10 sprouts, 6.9cm, the new sprout is not yellow like other three sprouts 10ph: 11 sprouts, 4.9cm, white powdery stuff, shriveled leaves, brown red dots
Dec 15 2023	4ph: 5 sprouts, 5.5cm, The tallest is the straightest, others bendy/wobbly 7ph: 10 sprouts, 6.9 The 2 tallest are starting to bend, new sprout no leaves open 10ph: 11 sprouts, 5cm, all leaves are uneven, shriveled curved colors
Dec 16 2023	4ph: 5 sprouts, 5.5cm, 3 are twisty/funny + the baby sprouts leaves are shriveled 7ph: 10 sprouts, 7cm, all are wobbly, the new sprout leaves are starting to open 10ph: 10 sprouts, 6cm, one more
Dec 17 2023	4ph: 4s, 5.5cm, 1 died from steam thinning and going weak 7ph: 10s, 7cm, leaves healthy No deformity, baby sprout has slight red dots 10ph: 10 sprouts 5.3cm deformity, white powder, tilted
Dec 18 2023	4ph: 4s, 5.5cm, the tallest is heaviest, others are shriveled, curved, bending 7ph: 10s, 7cm, the newest sprout grows slowly, tallest is really bendy 10ph: 9s, 5.3cm 1 more died, sprout
Dec 19 2023	4ph: 4s, 5.5cm, they are bendy, shortest leaves shriveled. 7ph: 10s, 7cm, Another sprout is bending, tallest sprout leaves are starting to open 10ph: 8s, 5.3cm, Another sprout died, 4 out of 8 sprouts have one big leaf

Sofija & Kaveeshes Logbook

Dec 20 2023	4ph=3s, 5.5cm, the smallest died, shriveled leaves, thinning stems in certain areas, All are bending 7ph=10s, 7.5cm, tallest 5 are really bendy, tinnest sprout hasn't opened leaves, others have light stems and medium dark leaves 10ph=5s, 5.3cm, shriveled leaves, red dots, tallest is slightly bending, different coloured & size leaves & stems (red, yellow, orange specks on leaves)
Jan 8 2024	Worked on our slides and finished uploading our procedure to them.
Jan 10 2024	Worked on our slides and worked on the extra background research paragraph on Alkalinity.
Jan 12 2024	Added our data ~~graphs~~ to the slides and got the bibliography done and the other slides ready to add info to.
Jan 15 2024	Added our data to the charts. And Added some observations and photos
Jan 16 2024	Added more observations on the angula half of the experiment ~~An~~ d green onion
Jan 17 2024	Worked on our observations and alkalinity paragraph. Made the graphs
Jan 18 2024	Adjusting the observation slides to fit best when Printed for the trifold.
Jan 19 2024	Angula graph is done and finished the greenonion graph.
Jan 21 2024	We finished the analysis of research, our Conclusion and our sources of error
Jan 22 2024	We finished all of the slides + printed them out to start the trifold, Adding slides to tri fold
Jan 23+25 2024	working on our trifold, glueing stuff on trifold

Sour Showers Observation

Green Onion observations

Nov 30 2023

NOC= No other changes Except Height

Day 1
4ph : 1.3cm
7ph : 1.3cm — Greenish yellow in colour
10ph : 1.9cm

Day 2
4ph : 2.3cm
7ph : 2cm — split into 2 shoots
10ph : 1.9cm

Day 3
4ph : 2.5cm Dark green
7ph : 3.5cm Light Green
10ph : 4cm Light green roots above soil

Day 4
4ph : 5.4cm Both shoots same size
7ph : 6.6cm slightly taller shoot
10ph : 7cm One super short shoot and one tall one

Day 5
4ph : 8cm NOC
7ph : 10.3cm Tall shoot 2x short one
10ph : 11.6cm NOC

Day 6
4ph : 11cm Very slanted
7ph : 14cm NOC
10ph : 17cm NOC

Day 7
4ph : 14.1cm NOC
7ph : 17.3cm NOC
10ph : 20.2cm NOC

Day 8
4ph: 17.6cm NOC
7ph: 23.1cm NOC
10ph: 24.4cm 3rd shoot grew

Day 9
4ph: 20.1cm NOC
7ph: 24.6cm 2nd shoot not growing much
10ph: 26.2cm 2nd shoot not growing at all

Day 10
4ph: 23cm crust on root
7ph: 25.1cm NOC
10ph: 28cm NOC

Day 11
4ph: 25.8cm NOC
7ph: 26.7cm 3rd shoot grew
10ph: 29cm NOC

Day 12
4ph: 28cm 3rd shoot grew
7ph: 28.4cm NOC
10ph: 30.3cm NOC

Day 13
4ph: 30.5cm Very Dark in colour, tiling
7ph: 30cm Brownish Tips
10ph: 29cm Tilting slightly

Day 14
4ph: 32.5cm
7ph: 33cm — All Bent
10ph: 34cm