Science Fair Logbook 2024-25

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Timetable

1. Find a topic by October 30.

2. Finish my hypothesis, variables, and background research before the 14th of Nov

3. Finish my procedure by Nov 21st

4. Conduct your experiment - before Dec 9 - discuss my findings with the teacher

5. Analyse my observations and work on the rest of your project report - winter break (Dec 9 to Jan 13th)

5. Submit my finished project for formative evaluation on Jan 14th (So I receive feedback)

6. The Final Copy of my science fair project is due for summative evaluation on Jan 20th

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On November 14-17 2024, I had 3 topics in mind one What amount of caffeine in coffee is the best to drink and affects your heart rate the least another was What pond in Calgary will produce the cleanest water from a homemade water filter? Lastly, My final idea was Whether wooden spoons are truly eco-friendly. after lots of thinking I decided that my science fair topic for this year would be" Are wooden spoons truly eco-friendly?" My testable question would be" What wooden spoon brand will decompose the most in a certain period in soil, the Kirkland brand from Costco, the Evo brand from Walmart, or the president's choice brand from The Canadian Superstore from three big box grocery franchises in Calgary Alberta?" this was because it relates to what is currently happening in the area I live in. It was a much simpler topic than the others.

On November 17-19 2024 I did 2 slides of background research that covered Why plastic spoons are banned in Alberta and how single-use plastics harm the environment. I also did my controlled variables, manipulated variables, and responding variables.

Why were plastic spoons banned in Alberta?

At one point in time, I bet you have used plastic spoons and thrown them out into the garbage without a second thought, well what if I were to tell you that what you just did harm the

environment? Because plastic spoons are so small for recycling they are sent to landfills where they can take hundreds of thousands of years to decompose meaning they stay there for a long time and slowly pile up and takes up a lot of space. That's not all because while the spoons are decomposing for a long period they also release greenhouse gasses. Some other ways plastic spoons harm the environment is when they enter waterways and can harm aquatic life in ponds rivers and even oceans.

The ban on single-use plastic

Back in June of 2022, the federal government worked together to publish the single-use plastics prohibition regulations, which stopped the manufacturing of single-use plastics. This transition to stop single-use plastics led to wooden utensils being made to replace plastic counterparts because they decompose a lot faster than plastic.

Constant/Controlled variables

- The type of soil I use (promix premium potting mix), the location I put the spoons in soil, the pot/cup they are put in, and the scale used to measure the spoon's mass will be constant variables because they are staying the same while I do my experiment.

Manipulative variables

- The Kirkland brand from Costco, the Evo brand from Walmart, and the President's Choice brand from The Canadian Superstore are my manipulated variables because they are what I am testing

Responding variables

- How much each spoon decomposes in the soil in a certain period (the mass it loses) is

my responding variable because it is what I am getting from doing the experiment

On November 20th, 2024 I completed my procedure along with another slide of background research about spoons' history. I also edited the past work that I have done by correcting some spelling errors.

1. Make sure you have the proper materials to do this experiment like the potting soil cups and the spoons.

2. You need to get nine big red cups and put labels on them, three should say the Evo brand from Walmart another 3 should say the Kirkland brand from Costco, and label the last 3 cups with the president's choice brand from The Canadian Superstore.

3. Next you must grab the promix premium potting mix and fill the big red cups so that it is filled to the very top do this for all 9 cups

4. Before you start to put the spoons in their respective cups you first must check how much each spoon from each brand mass and record those findings in your logbook.

5. Then you will grab the Kirkland brand spoons from Costco and cut them into two pieces then insert the two pieces into the labeled cup that says “Kirkland brand from Costco” Make sure the two parts of the spoons are fully submerged do this for all the cups labeled with the Kirkland brand.

6. Next you will grab the President Choice brand spoons from The Canadian Superstore and cut them into two pieces then insert the two pieces into the labeled cup that says “President's Choice brand from The Canadian Superstore ” Make sure the two parts of the spoons is fully submerged do this for all the cups labeled with the presidents choice brand.

7. Next you will grab the Evo brand from Walmart and cut them into two pieces then insert the two pieces into the labeled cup that says “Evo brand from Walmart ” Make sure the two parts of the spoons are fully submerged do this for all the cups labeled with the evo brand.

8. After the spoons are added to the soil add 1 cup of water to each big red cup filled with soil

9. REMINDER TO ADD WATER ON THE 15th DAY AND ADD 1 CUP OF WATER

10.put the nine red cups somewhere safe so the wooden spoons can decompose (I put mine in my garage) but then wait 30 days then check up on the wooden spoons.

11. After 30 days have passed get the remains of each of the spoons out of the soil and keep them organized so they don't get misplaced.

12. After making sure to weigh each company's spoons and because each company had 3 spoons that were being tested calculate the average mass of the spoons, lastly you should note down the recordings of the experiment and the average in your logbook.*make sure you rub all the dirt on the spoons off so the mass can be more accurate.

History of Spoons

Spoons have been around for a long time, but they date back to 1000 BC and were invented by the Ancient Egyptians who came up with the idea of a spoon and after thousands of years they are still being used by humans like us. The Egyptians did not have metal spoons like most of us they made spoons out of flint, wood, and ivory. They used wooden spoons, this makes the difference between us and the Egyptians very little because now in our current time, we are using wooden spoons to replace single-use plastic ones.

On December 1st, 2024 I started my experiment and followed the steps of my procedure. I also recorded the weight of the spoons before they were put to decompose in the Promix premium potting soil.

Different Brands of spoons before Experiment	Spoon 1	Spoon 2	Spoon 3
Kirkland	2.75 grams	2.78 grams	2.75 grams
Evo	2.42 grams	2.42 grams	2.41 grams
President's Choice	2.76 grams	2.75 grams	2.76grams

On December 5th, 2024 I took some photos for my observations.

On December 10th I took some photos for my observations.

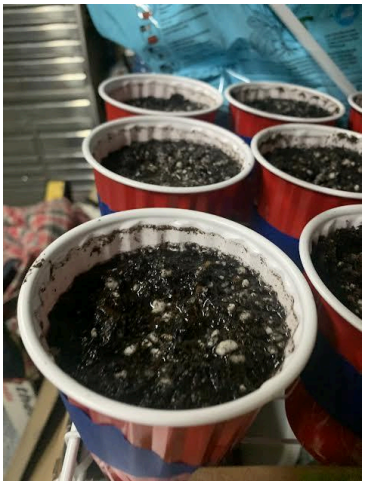
On December 13th I started to work on the “doing my experiment” slides where I showed me the steps in my procedure, I did 4 of the slides on that day

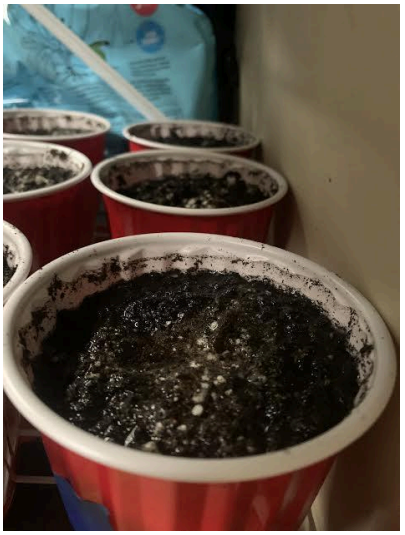
On December 15th I again followed my experiment and watered the spoons' soil so the solid could stay moist. I also took pictures for my observations

On December 20th, 2024 I took some photos for my observations

On December 24th, 2024 I worked more on the “experimenting” slides where I showed the steps in my procedure, I did 4 more slides

On December 25th, 2024 I took some photos for my observations.





On December 31st, 2024 I took the spoons out of the cup and measured their weight again to see the change in grams and noted it down on my logbook and I took photos for my observations.

Experiment Results

Weight Of Spoons After Experiment	Spoon 1	Spoon 2	Spoon 3
Kirkland	2.51	2.56	2.54
Evo	2.33	2.39	2.35
President's Choice	2.62	.2.71	2.67

On January 10th, 2025 I completed my list of materials for my science fair

1. Pack of Promix Premium Potting soil

2. Spoon brand Evo from Walmart

3. Presidents choice brand wooden spoons from the Canadian superstore

4. Kirkland brand wooden spoons from Costco

5.9 big red cups/pot

6 .scissors

8. water

9. Tool to measure water (should measure at least 1 cup)

10. scale (that measures 0.01 grams)

11.(RECOMMENDED) Gloves

On January 12th, 2025 I did my observations (1)-(5)

Observations 1

After I put the spoons into the soil i then would go check up on it every 5 days and note down the changes of the soil. On the 5th day after putting the spoons into the soil I noticed that the soil was still moist after 5 days of it being in my garage.

Observations 2

After 10 days I saw that the soil was less moist and that the soil looked more black this means that the soil was more rich and healthy than before. Another important thing to mention is that I saw The Kirkland brand soil be more moist compared to the other brands even after 10 days.

Observations 3

On The 15th day of my experiment I added 1 cup of water to each of the 9 cups with spoons in them this made the soil moist again in all of the cups as you can see in the image below

Observations 4

On the 20th day the soil looked almost the same as it did on the 15th day because it did not take in most of the water, but the soil seemed even more rich than it did on the 10th day.

Observations 5

On the 25th day, I saw that the moisture in the soil for the Kirkland brand was still there, but the Evo brand's soil seemed to absorb the moisture because it was a lot dry, while the President's Choice brand was not entirely dry but it was still a little moist.

On January 13th, 2025 I completed the Observations," Doing My Experiment", and my Conclusion

Observation 6

On the 30th there were practically no changes in the soil or its moisture except for the fact that the soil was now dry for all 9 cups. After removing the spoons I was able to notice that the spoons had formed white mold in all different places.

Conclusion

Everything in this experiment had different outcomes

The Evo brand's average mass after the experiment was 2.356 grams

The Kirkland brand's average mass after the experiment was 2.536 grams

The President's Choice brand's average mass after the experiment was 2.66 grams

To find out which spoon was the best you have to subtract the new average that you got after the experiment and subtract it from the original average mass of the spoons before the experiment.

Evo brand: 2.416-2.356=0.06 grams

Kirkland brand: 2.76-2.536= 0.224 grams

President's Choice brand: 2.756-2.536=0.22 grams

As you can see from the calculations done above the Kirkland brand lost the most mass in grams over the 30 days. This makes my hypothesis wrong because I stated that I thought the

Evo brand would decompose the most but it decomposed the least compared to the other brands. The Kirkland brand spoons decomposed the most because it was corn starch-based so it is extremely biodegradable. The reason the President's Choice brand decomposed more than the Evo brand was that it was a wheat-based wooden spoon, unlike the Evo spoon which was plain wood with a mineral layer.

On January 16th, 2025 I added graphs that displayed the results of my experiment.

On January 17t,h 2025 I did sources of error and my applications.

Sources of error

- Even though the spoons were in the same temperature the temperature was not consistent it was constantly changing this could have affected the results of my experiment, because temperature plays a vital role in controlling the growth and activity of microorganisms during decomposition.
- The amount of soil I added to each of the cups was not going to be the same, I tried my best to keep it the same amount but some cups had more soil than others which could have affected my experiment results.
- Before I checked the mass of the spoons after the experiment I rubbed the dirt I could off of the spoons, but there could have been a chance that some dirt stayed on the spoons and affected the results I got for my experiment.
- Placement of the spoons, Even though I tried to put the spoons in the same spot in each cup I most likely was not able to put them in the same spot I am not sure if this could have affected my result, but it might have.
- I also had experiment limitations on how much time I could put the spoons into the soil for them to decompose if I had more time to conduct my experiment I could have gotten more accurate results on how the spoon brand would decompose because the

spoons would have more time to decompose making them lose more mass to get more accurate results for my experiment.

Applications

My future plans for this experiment are to expand on this topic as I did not go as in-depth into this topic as I wanted to I wanted to not just focus on spoons I would have liked to also cover other biodegradable items like wooden disposable plates, cups and more things that were changed to be more biodegradable that its plastic counterparts in the single-use plastics prohibition regulations. So next year I would like to cover disposable wooden plates and cups, spoons, forks, and other disposable wooden items and find out which brand overall makes the most eco-friendly and biodegradable items.

On January 18th, 2025, I completed my Data and analysis

If you look at the graphs and the table of observations you can see that the Kirkland brand lost the most mass with the President's Choice brand following it, and lastly, the Evo brand lost the least amount mass.. The Kirkland brand lost 8.12% of its mass, the President's Choice brand lost 7.96% of its mass, and the Evo brand lost 2.48% of its mass. Even though the Kirkland brand might have decomposed more quickly because it was more biodegradable it was cornstarch-based. That's not all because other things like the temperature could have affected the outcome of this experiment as temperature has a huge role in decomposition so could moisture levels and oxygen availability. After doing more research into why cornstarch is so biodegradable it's because it's made from plant-based resources that can naturally into things like carbon dioxide and water.

On January 19th, 2024 I added to my background research by doing 2 more slides that covered the information about the spoons I am testing and factors that affect decomposition. I also edited and went over all of my science fair because I then submitted it.

Research on the spoons I am testing.

In my experiment, I am testing three different spoon brands including the Kirkland brand from Costco, the Evo brand from Walmart, and the President's Choice brand from The Canadian Superstore. After researching I was able to determine that the Kirkland brand is cornstarch-based with a weak mineral coating, the Evo brand is just plain birch wood with a thick mineral coating, and lastly, the President's Choice brand was wheat-based with a mineral coating on top.

Factors that affect decomposition

Many factors can affect decomposition like temperature, temperature affects decomposition because controls the growth and activity of the microorganisms. Moisture also affects decomposition because the water in the soil is responsible for the processes of microorganisms present in the soil. The soil's pH is another major factor in decomposition because it affects microbial growth. Microbial growth is the increase in the number of microbes.