

JEI Editor's Letter

Manuscript: *Redacted for Privacy*

Authors: *Redacted for Privacy*

Scientific Reviewer 1: Graduate student at Emory University with expertise in Biology and plant response to environmental stimuli

Scientific Reviewer 2: Graduate student at the University of Michigan with expertise in Biology, Botany, and Chemistry

Scientific Reviewer 3: Graduate student at Tufts University with expertise in Biology and Botany

Scientific Reviewer 4: Graduate student at the University of Michigan with expertise in Chemistry and Biology

Decision: Accept pending Scientific and Presentation Changes

General Comments from the JEI Editors and Scientific Reviewers

This section contains general comments written by both the JEI editors and the Reviewers. These comments do not contain any required/recommended revisions but instead are meant to convey the Editor's/Reviewer's opinion on the manuscript as a whole.

JEI Editor Team

This manuscript investigates a relevant topic regarding mitigating acid rain for plant health. We are excited to work with you to publish your manuscript in JEI. However, prior to publication we request some revisions to the written presentation of your manuscript and the scientific portion. We think the manuscript has much of the necessary information, but could benefit from reordering these details and, if possible, adding to your experiments. We understand if some recommended changes cannot be made, but have brainstormed ideas to further strengthen your interesting report. When you address required and recommended changes, please note clearly in response to each bullet point how you made the changes (where the changes are located, how you changed something, etc.). With the required edits, we are sure this manuscript will make an excellent JEI publication, and we look forward to receiving your revised version!

Scientific Reviewer 1

Congratulations on your manuscript! I understand the rationale for your experiment, but the writing needs some refinement to help more clearly convey your ideas. This resource may help you with formatting your writing to be more scientific: <http://doi.org/10.1002/bes2.1258>. I think it's also important to repeat your experiments more than once to ensure that your results are reproducible, so I would urge you to do that as well.

Scientific Reviewer 2

A very interesting concept! I recommend some reworking of the manuscript to improve readability and style.

Scientific Reviewer 3

Congratulations! Submitting your work to a journal is a huge step and you should be quite proud. In general, your work is well-motivated, well thought out, and nicely presented. I think some alterations to the information and expansion on certain aspects of the work, particularly the pH of rainwater tested, will improve the manuscript. Well done!

Scientific Reviewer 4

Congratulations on submitting a manuscript on a very relevant and interesting topic. I do not require any further experimentations for publication, but I suggest you revise several aspects to make the manuscript even stronger. I recommend that you see the JEI website for more resources on what to include in each section of the paper: <https://emerginginvestigators.org/submissions/manuscript-content>. Feel free to also browse through other published JEI articles to see how they structured their writing. Again, congratulations on this work – I encourage you to keep exploring your interest in research.

Science Comments

This section contains comments on the science, including experiments and analysis.

We believe this manuscript focuses on a very interesting topic important for mitigating acid rain and keeping plants healthy. To further strengthen your report, we require a few changes regarding more detail and discussion. This will help strengthen your argument and provide more clarity. We also strongly recommend some changes focused on replicating data and gaining statistical information to further support your observations. We do think the paper is interesting, and believe the study was carried out well!

Required Changes

We believe that these revisions must be made in order to publish in JEI. If any changes are impossible, please include an explanation in your cover letter.

- Please provide the results of your testing the pH of rainwater. In the manuscript you note that it was "always around 4.8", but we need to see the evidence of this either in graph or table form. Please provide the details of how you collected this rainwater, how many samples you collected, etc.
- You later mention that this shows the "universality of acid rain in our country". This is overstating as the only way to determine this would be to collect rainwater from multiple sites. Are there any published studies that support this claim? Maybe there is a publication showing the average pH of rainwater from each state/region.
- Please provide details/rationale of pH measurement. Is measuring the pH of the water escaping the soil the best way to measure soil pH? Why only measure after 30 minutes? What would happen after a longer period of time? Including longer time points would be ideal. We understand if you cannot do longer measurements, but please address the rationale of the pH measurement.
- Please add more discussion of the results, particularly of the rainwater. Please add a standard deviation to the mean rain pH (how did it vary?) and consider adding a figure to go with it. This is an interesting aspect of the work and it is kind of hidden at the moment!
- I am slightly confused about why the pH of the collected water changes over time, when the acid-base reaction happens instantly. Does it take that long for the solutions to mix? Please clarify this.

Recommended Changes

We have compiled a list of recommended revisions that would help further improve the manuscript. These recommended revisions are not required for publication, but we strongly encourage you to seriously consider them. These revisions will further improve the scientific rigor of the manuscript.

- If possible, we strongly recommend repeating your experiment at least three times, and perform a statistic test (example- student's T test, or average results across three replicates within your groups at the least) on pH values to determine if they are significant and reproducible results. It is important in science to test things multiple times to make sure that what you observe is not an outlier.
- Please consider running a regression to see if there is a significant relationship between the pH values and time – you should be able to do this in excel.

- Please consider testing the effect that pH has on plant health. This could be tested by watering identical plants with the same three conditions (water only, water with acid, water with acid and base) over time to see which plants survive. Plants could be purchased from a store fully grown to minimize time spent growing plants. Another experiment that could look at germination rate/survival of seedlings in these three conditions. An easy plant to use for this would be catgrass which grows quickly and are readily available at stores like Pikes or Walmart. You could germinate a certain number of seeds and only water with the three conditions (water only, water with acid, water with acid and base), to determine if the acid has any effect, and then count how many seedlings grow/survive over a certain amount of time. This would greatly bolster your claims that acid rain has an effect on plants. If anything, this would be a really interesting follow-up study to conduct!

Presentation Comments

This section contains feedback on the clarity of writing and the presentation of data.

This manuscript has many of the important pieces of a paper, though we recommend moving these pieces around to better fit the format of a JEI article. We recommend keeping your audience in mind while restructuring and adding to the manuscript. But generally, we applaud you on this manuscript!

Required Changes

We believe that these revisions must be made in order to publish in JEI. If any changes are impossible, please include an explanation in your cover letter.

General changes

- Referencing literature and providing more background: Please provide evidence from peer-reviewed sources on the significance of acid rain on agricultural production. There is no evidence provided in the manuscript that allude to this, only generalizations such as it has “detrimental effects on trees”. What acidity over what amount of time has the most significant effect on plants? Is acid rain more prevalent in areas with more pollution? Your manuscript will be strengthened if you can ensure everyone that reads this paper clearly sees why the effect of acid rain should be studied. This will mainly be in your introduction.

Summary

- The Abstract is called a Summary in JEI articles – please change this heading accordingly.
- Word count: The Summary should be under 250 words (currently it is 285). You did a good job describing the significance of acid rain, but I think you can cut down the first 8 sentences to make it shorter. However, these sentences could (and should) be included in the Introduction.

Introduction

- Restructuring the introduction: You have a good start on your Introduction, but it could benefit from a bit of restructuring. Think of the structure as an “inverted pyramid” that starts with very broad facts before focusing on the specific question and hypothesis toward the end. In general, it should include:
 - The overarching scientific topic of the paper.
 - Background information such that the audience understands the question being asked and why this question is of interest.
 - A clearly state hypothesis. Note: This should not be phrased as a question.
 - Summary of the conclusions drawn from the research.
- Enhance clarity with more detail in the introduction/background: To ensure everyone reading your manuscript understands this, please include the following:
 - What is acid rain and how is it different from regular rain?
 - Why is acid rain a problem? Who is it a problem for? Why should we care about this as a society?
 - What is the gap in knowledge about acid rain that needs to be addressed? (Yours would be something along the lines of “how do we reduce the effects of acidic rain on plants?”.)
 - How are you going to address this question/gap in knowledge? In your case, it would be by testing to see if the nitrogenous fertilizers can affect soil pH.
 - What do you expect to happen (ie. your hypothesis)?

- What impact would your experiments have on society as a whole? Think of the big picture. Maybe farmers could start applying more fertilizer, etc. You can give a brief introduction to acids/ammonium nitrate and sulfate but remember to only include relevant information. Boiling point may not be relevant, for example.
- Paragraph 2: you went into detail about the impact of acid rain on the environment in the Summary, but less so here. As mentioned above, you can move/add these sentences to your Introduction. Generally, the Summary is considered to stand alone from the rest of the paper, so it is okay to discuss these ideas again and in greater detail in the Introduction.
- Paragraph/sentence flow and order:
 - Your introduction has 2-4 sentence paragraph which gives a choppy appearance. Please flush this out with the above notes and merge some thoughts to create 5-8 sentence paragraphs that flow.
 - When reworking the introduction, please focus on order. A logical flow might be starting with your hypothesis and then moving into your plans for experiments.
- Cut extraneous information: There is some extraneous information included in this section such as the properties of pure sulfuric and nitric acid. These properties will not be relevant to you as you will only be working with dilute solutions. Some of the important aspects to discuss are that they are major components of rain and they cause undesirable impacts on the environment.
- Grammar and format:
 - P3L42, the word acid is not a proper noun and therefore should not be capitalized in the middle of a sentence.
 - P4L4, the words sulfuric and nitric are not proper nouns and do not need to be capitalized. Please correct this throughout your manuscript.
 - P4L9, the 2 and 4 in the chemical formulas should be subscripts.

Results:

- Restructuring the results section:
 - Paragraphs 2~7: Most of your text in this section is more appropriate for the methods section. You should include a brief explanation of how the experiment was performed, but not the details.
 - Paragraph 3: The first part of your first sentence is repetitive, as it has already been made clear what the major components of acid rain are. You can simply start by saying you don't have constant access to rainwater, so you made solutions of sulfuric acid and nitric acid as substitutes.
 - Paragraph 5: Calculations don't need to be included like this. Your first sentence in this paragraph would suffice.
- Overall, your results section should do the following:
 - Briefly describe the rationale for the experiment (you somewhat did this in paragraph 1).
 - Briefly explain how the experiment was performed (leaving lengthy details for the Materials and Methods section)
 - State your findings and briefly interpret the data, while referencing the figures that contain the results. You touch on this in the second to last paragraph, but largely this has not been addressed – this is one of the most important parts of your manuscript! We'll definitely help you refine it but want you to provide the first go at this.

Discussion

- Do you think the type of soil used might have any effect on your results? Please discuss.

- Paragraph 1: you can be clearer about the point that you are trying to make. Instead of saying “the solution,” you can say something like “In this experiment, solutions that were designed to simulate acid rain were neutralized to pH 6.8 using a treatment of ammonium hydroxide.
- Paragraph 2 is quite short and could be tied into the first paragraph.
- Paragraph 3: Your limitations should be discussed in paragraph form, not in lists like this (JEI and most journals actually do not allow for straight lists). Additionally, these limitations are more along the lines of how your experimental process could impact the results, rather than what would have made it easier for you.
 - For example: The item in the list on tap water is a great point. You mentioned that you repeated the experiment by first measuring the pH of the water but tap water could contain trace contaminants of metals and other species. Would the presence of contaminants like this impact your results?
- Paragraph 4 describes the main limitation that I can think of, so great job including it. Another possible limitation for implementing this in actual households would be having someone without a background in chemistry calculate the amount of base to add, and thinking about what would happen if too much or too little were to be added. You touch on determining a sort of formula in Paragraph 4, but I can imagine it would be different depending on location?

Materials/methods:

- This section needs to be rewritten – you have a good start and details in other parts of your manuscript already. The methods should be described in enough detail so that another scientist could perform the same experiments and obtain the same results. I suggest reading through this section as if you have never done it before or have someone else read it that was not involved in the project, to make sure you have included all of the important details. Please review the online JEI guidelines or see a published article online to see the best way to format this section.
 - You are missing several important details. For example, there is no information about the concentrations of your acidic and basic solutions, pH values are missing, type of water is missing, etc.
 - Additionally, this section should be written in paragraph form. You did this at the beginning, but you stopped toward the end when you started mentioning the different groups.
 - Please remove interpretation from this section (move the first 3 sentences to the discussion).
- What type of soil was used in the pots? Please specify if possible.

Recommended Changes

We have also compiled a list of recommended changes. These are not required for publication, but we strongly encourage you to consider them. These revisions will further improve your manuscript and show you examples of good scientific writing.

General changes

- In either your introduction or conclusion, please consider discussion fertilizer. Please research the amount of nitrogen-containing fertilizer that is detrimental to plants. What if you are able to neutralize the effect of acid rain but end up killing the plant because too

much fertilizer is released? Also, excess fertilizer can run off and enter our water supply and also cause lasting environmental damage, please consider addressing this.

- Typesetting math in Word can help you with putting the equations for your calculations in a form that is more readable.

Title

- Please consider changing the title as it currently reads as a fragment.

Summary

- Please avoid using the word “your” in scientific writing.
- There is some tense (past, present, etc.) confusion in the abstract. I find the best way to correct this is to read the section out loud to catch some of these occurrences.

Introduction

- Please consider ending your introduction with a paragraph that acts as a sort of road sign for your readers to orient them. One sentence outlining your study approach, followed by a sentence or two defining your hypotheses, then a sentence that hints at your results would improve the paper.

Results

- Please precisely articulate these results. The use of words such as “the results were always around 4.8” are not ideal because they can convey you are uncertain about your results. It is okay to list an average with a standard deviation to show the range of values you saw as standard deviation is considered an exact calculation (even though it represents variation).
- Please also try to keep the results section to only results, without any interpretation. This means moving the statements such as “this result showed... which means our experiment is meaningful...” to discussion.
- Please make sure arduous experimental data is moved to materials and methods (also move calculations).

Figure Comments

This section contains comments on the presentation of the data in figures and tables.

Required Changes

We believe that these revisions must be made in order to publish in JEI. If any changes are impossible, please include an explanation in your cover letter.

- Error: If it is possible to determine the error associated with your pH measurements, please include error bars in your figure. pH probes tend to deviate a fair amount.
- You have analyses of the pH of rain samples, but is there a figure way that you can display the results of the data? Maybe a histogram?
- Detail: For reference, a figure should be able to be read and interpreted independently from the rest of your manuscript – let that dictate how much detail to include.
 - In Figure 1, it is unclear how quickly you are adding the solutions and in what volume. Please change your figure description to include this information.
 - Please include full chemical names for abbreviated chemicals and what you want readers to take away from figures.

Recommended Changes

We have compiled a list of recommended revisions that would help further improve the figures. These recommended revisions are not required for publication, but we strongly encourage you to consider them. These revisions will further improve the data visualization and aesthetics of your figures.

- I think it would be great to include a picture of your setup to help the reader understand how you irrigated and collected the water. This would add to your paper; however I am putting this in “recommended changes” in case you do not have the materials anymore.
- I recommend changing the color of the text in your figure to black.