

ESA 2008 Workshop 29: How to Write a Scientific Publication

Publishing is an important part of the research process, but writing papers is not what attracted most of us to the field of ecology. Learning to write papers with minimal effort and maximum impact will help you for the rest of your career.

To participate in this workshop, in addition to registering, you should complete a "Getting Started Exercise," which will form the basis of discussion and feedback in small groups. The exercise is available at www.esf.edu/oryanai/publishing/GSE.htm.

We will also provide you with general advice on organizing your writing efforts and specific examples of the steps you will go through in preparing each section of your paper.

Ruth Yanai, SUNY-ESF rdyanai@syr.edu

Writing Manuscripts for Publication

First, General Advice
Getting Started Exercise
Finally, Specific Advice

Is Writing Easy?

Don't make it harder than necessary!

Make it Easier

- Know your audience. Choose your journal before you write.
- Know your message. Don't report irrelevant information.
- Make an outline. Write only what you need.

Make it Easier

Before you begin to write:
Find the best question to go with your answers.
It may not be the question you had in mind when you started!

Choosing the Question

~~Original Question:
What factors explain high N mineralization rates after forest harvest?
Objectives: We measured soil moisture and temperature, gross and net N mineralization, ...~~

Results:
Stream and soil N concentrations were high after harvest. Mineralization rates were not higher than in the control! High nitrification results from the lack of uptake by trees, not from higher gross mineralization rates.

Choosing the Question

Better Question:
What factors explain high N rates of N export after forest harvest? Is it true that N mineralization rates are increased, or is increased N availability explained by the absence of tree uptake?

Results:
Stream and soil N concentrations were high after harvest. Mineralization rates were not higher than in the control. High nitrification results from the lack of uptake by trees, not from higher gross mineralization rates.

Another Example

~~Original Objective:
Our goal was to describe volume and nutrient content of coarse woody debris (CWD) as a function of silvicultural treatment in the Catskill Mountains of New York.~~

Results:
Volume of CWD was not closely related to cutting intensity. It was lower when fuel costs were high, because firewood was removed.
It was high after the particle-board factory closed.
It was high after a wind storm.

Another Example

Better Question:
What factors are important to predicting volume and nutrient content of CWD? Is harvest intensity sufficient?

Results:
Volume of CWD was not related to cutting intensity. It was lower when fuel costs were high, because firewood was removed!
It was high after the particle-board factory closed.
It was high after a wind storm.

Getting Started Exercise

1. Briefly explain why this research is important. To whom does it matter?
2. Write a statement that identifies the problem you were trying to solve in your research.
You know now how to check that the question goes with the results
3. Describe the results of your work, in a small number of bulleted phrases.
4. Write the conclusions to your paper.

Getting Started Exercise

1. Briefly explain why this research is important. To whom does it matter?
Now, how do we choose the context for the study and the conclusions?
4. Write the conclusions to your paper.

N Mineralization Example

1. We had an opportunity to measure gross and net N mineralization and nitrification in a clearcut in northern hardwoods.
Who cares? Why do we need to know?
2. What factors explain high N rates of N export after forest harvest?
3. Stream and soil N concentrations were high after harvest. Mineralization rates were not higher than in the control.

N Mineralization Example

1. The belief that decomposition and nutrient mineralization increase following disturbance pervades calculations of local and global C and nutrient budgets, but this belief is not based on direct observation.
2. What factors explain high N rates of N export after forest harvest?
3. Stream and soil N concentrations were high after harvest. Mineralization rates were not higher than in the control.
4. It is true that nitrate losses increase after harvesting, but this is not due to increased N mineralization.
This is a result! What should we tell the audience we addressed in #1?

N Mineralization Example

1. The belief that decomposition and nutrient mineralization increase following disturbance pervades calculations of local and global C and nutrient budgets, but this belief is not based on direct observation.
2. What factors explain high N rates of N export after forest harvest?
3. High nitrification results from the lack of uptake by trees, not from higher gross mineralization rates.
4. Ecosystem N budgets should not assume that mineralization increases after disturbance. Carbon budgets, too, may be in error if decomposition is assumed to increase after forest harvest.

CWD Example

1. Pools and nutrient concentrations of CWD have not been described in the Catskill Mountains...
This sounds like Objectives (#2). Who cares? Why do we need to know?
2. Is harvest intensity sufficient to predict volume and nutrient content of CWD?
3. Volumes of CWD depend on cutting intensity but also on markets for wood products and recent storms.

CWD Example

1. Predicting carbon and nutrient content of CWD over time after forest harvesting is important to managing forests for non-timber values. Therefore, we need to know what factors are important to making those predictions.
2. Is harvest intensity sufficient to predict volume and nutrient content of CWD?
3. Volumes of CWD depend on cutting intensity but also on markets for wood products and recent storms.
4. CWD volume is not readily predicted from harvest intensity.
This is a result! What should we tell the audience we addressed in #1?

CWD Example

1. Predicting carbon and nutrient content of CWD over time after forest harvesting is important to managing forests for non-timber values. Therefore, we need to know what factors are important to making those predictions.
2. Is harvest intensity sufficient to predict volume and nutrient content of CWD?
3. Volumes of CWD depend on cutting intensity but also on markets for wood products and recent storms.
4. CWD volume should be measured for accurate assessment. Nutrient contents, on the other hand, can be estimated from measured volumes and published concentrations.

In Small Groups

- Is #1 general enough?
- Does #4 relate back to #1?
- Do results (#3) answer the question in #2?
- If you find results in #4, move them to #3.

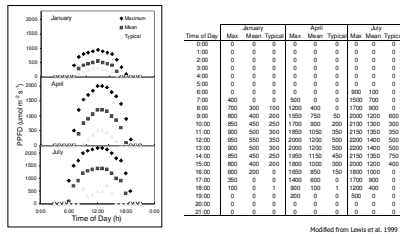
You can also help by asking questions if the author's meaning wasn't clear.

Getting Started Exercise

1. Briefly explain why this research is important. To whom does it matter?
2. Write a statement that identifies the problem you were trying to solve in your research.
3. Describe the results of your work, in a small number of bulleted phrases.
4. Write the conclusions to your paper.

Results

Figure vs. Table



Results

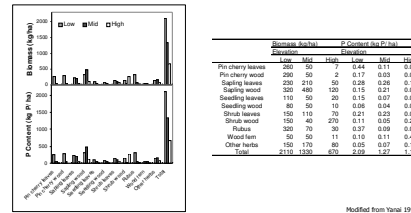
- Describe results with reference to hypotheses.
- Tell your readers what they should see in your tables or figures.
- Don't repeat information available in tables or figures.

Sequence of Section Preparation

5. Title and Abstract
4. Introduction
2. Methods
1. Results
3. Discussion

Results

Figure vs. Table



Methods

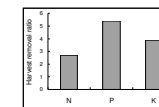
- Support data presented in Results
- Tell enough to allow another scientist to replicate your study
- Don't give information not needed to understand your results or replicate your study

Results

Table or Figure or Text?

Results

Figure vs. Table vs. Text



Element	Harvest removal ratio
N	2.7
P	5.4
K	3.9

The harvest removal ratio was highest for P (5.4), lowest for N (2.7) and intermediate for K (3.9).

Examples: What's Needed?

Samples were digested in nitric acid. Plots were marked with orange flagging at the northeast corner. Procedures followed Bickelhaupt (1986).

Introduction

- Describe the general problem to be solved.
- Review the relevant literature, just enough to orient the reader to the problem.
- Pose the specific questions to be answered in the Results and Discussion

Discussion

- Interpret your results.
- Place them in the context of other work.
- Address limitations to your approach.
- Suggest future work.
- Draw conclusions. Point out applications. Address your opening questions.

Abstract

- Problem to be solved
- Objectives or Hypotheses
- Methods or Approach
- Results
- Conclusions

Title

- Should Represent Paper's Content
- Keywords Facilitate Retrieval in Indices
- Make it Brief but Meaningful (Don't waste words)

Picking the Best Title

1. The effect of mycorrhizal association on seedling uptake of nitrate versus ammonium
2. The effect of mycorrhizal association on nitrogen uptake by *Eucalyptus canadulensis*
3. Mycorrhizal association improves nitrate but not ammonium uptake by *Eucalyptus canadulensis*

Literature Cited

- Follow journal format
- Errors cast doubt on the author's attention to detail in research
- Bibliographic software helps prevent errors and saves time

If at first you get rejected,

Try, try again!

Reasons Not to Change your Question

- You worked so hard on it.
- You pasted it in from your original research proposal and haven't read it since.
- It's not historically true.
Save the original question for your autobiography. Your journal audience doesn't care about your history. They want to know the importance of your findings.

<http://www.esf.edu/for/faculty/yanai.htm>