SCIENCE 2008 Workshop 29: How to Write a Scientific Publication

Writing Manuscripts for Publication

First, General Advice

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

Better Question:
What factors explain high N mineralization rates 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.

Choosing the Question

Another Example

Original Question:
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.

Is Writing Easy?

Don’t make it harder than necessary!

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.

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.
3. Describe the results of your work, in a small number of bulleted phrases.
4. Write the conclusions to your paper.

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 N losses increase after harvesting, but this is not due to increased N mineralization.

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 can be readily predicted from harvest intensity.

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.

Sequence of Section Preparation

5. Title and Abstract

4. Introduction

2. Methods

1. Results

3. Discussion

Results

Table or Figure or Text?

Results

Figure vs. Table

Results

Figure vs. Table

Results

Figure vs. Table

Results

What’s Needed?

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

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.

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

Examples:

The harvest removal ratio was highest for P (1.7), lowest for N (0.2) and intermediate for K (1.3).
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

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.

If at first you get rejected,
Try, try again!

http://www.esf.edu/faculty/yanai.htm