

## A Guide to Tracking Germination Rates in the SER-UW Nursery

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### Introduction

Keeping thorough records is an important part of plant production as it facilitates the development of successful propagation techniques. For instance, if a particular set of seeds fails to germinate at its expected rate, then you can look back at your records and start to figure out what went wrong. Similarly, if a particular species ends up taking longer than expected to germinate, then you can consider stratifying them earlier in the season. On the other hand, if a particular species does reach its expected germination rate in a timely fashion, then you'll be able to look back at your records and replicate that result in the future. In short, record keeping enables nurseries to perfect their propagation procedures.

### Contents of the Germination Record

The Germination Record tracks all dealings with each seed lot from the time of scarification (if applicable) to their current or final germination rate. The information contained within the document can be broken down into the following four categories:

- General Information: botanical name, common name, and seed lot code
- Pre-sowing Information: time spent in stratification, and any other treatments that the seeds received (such as scarification or natural stratification)
- Sowing information: date sown, number of cells sown, number of seeds per cell, total number of seeds sown, and the media the seeds were sown in
- Post-sowing Information: date of first germination, number of days since sowing that the first germinant appeared, weekly germination rates, and a literature germination

The Germination Record also contains the following symbols (The meanings of these symbols can also be found within the document, if you hover your cursor over cell A1):

- "?" Indicates uncertainty due to possible volunteer seedlings
- "\*\*\*" Indicates a non-applicable field due to seeds being sown in a flat
- "ND" means no data

## **The Process:**

I would count the germinants once per week, usually right after the weekly work party. I found that this worked well from both a time management perspective and in the sense that one week seemed to be enough time for the germination situation to change noticeably but not drastically. When counting the germinants, I would make note of both the number of cells in which germination had occurred and the total number of seeds that had germinated across all cells. If some seedlings were too young to determine whether or not they were actually the desired species or just a volunteer seedling, then I would indicate this uncertainty with a question mark.

After the data had been collected, I would enter it into the document titled “Germination Log” (This does not have to be done immediately after data collection.). The Germination Log (as opposed to the Germination Record) is essentially a list of all germination data collected over the growing season, grouped by the date the data was collected. This document is rather large and is consequently difficult to quickly glean any useful information from, but the document *is* quite useful for what I would call “data processing.” First, I would enter in the data from the most recent collection day. Then, I would divide the number of seeds germinated by the number of seeds sown in order to calculate the current germination rate (these columns are side by side, which makes the calculations go very quickly). Finally, I would copy and paste the germination rates for the given week to the appropriate column in the Germination Log.

Also, as aforementioned, the Germination Record also includes pre-sowing information, such as scarification methods (and other treatments) and days spent in stratification. It also includes a column detailing the media the seeds were sown in. This information can be found in the documents titled “Propagation Records” and “Species in Strat.”

Finally, if you happen to notice that any of the germinants’ containers are looking dry, please water them. Keeping the germinants’ containers moist (even the top few centimeters) is critical for imbibition and germination to occur.

## **Expected Time Expenditure**

At the beginning of spring when relatively few species have been sown, data collection takes approximately 45min and data processing takes approximately 45min as well. Later in the season when more seeds have been sown, data collection can take up to 80min and data processing takes approximately 60min. Occasionally some research into the germination rates of certain species may be required, but this usually doesn't take any longer than 10min per species.

## **General Tips:**

--- Grouping the cells that have already germinated makes counting them much less time-consuming. Grouping the cells that have germinants of questionable identity on the opposite side of the rack is also useful.

--- Utilizing the "Copy & Paste" feature can make multiple parts of the process go much faster. The keyboard shortcut for "Copy" is "CTRL" + "c" and the keyboard shortcut for "Paste" is "CTRL" + "v". Sometimes if you try to copy and paste via right clicking in Google Sheets, it will say that you need to download the program in order to copy & paste, but it will work just fine if you use the keyboard shortcuts.

--- When a new kind of seed is sown, you may need to look up a literature germination rate. The best places to find germination rates are the Native Plant Network's Reforestation, Nurseries, and Genetics Resources Propagation Protocols webpage

(<https://npn.rngr.net/propagation/protocols>), Jon Bakker's ESRM 412 Propagation Protocols webpage (<https://courses.washington.edu/esrm412/protocols/protocols.htm>), and the University of Washington's "Index of /propplnt/Plants" (<https://depts.washington.edu/propplnt/Plants/>) . If you have no luck with any of these websites, then a Google search can sometimes yield results (Commercial nurseries will sometimes list germination rates when they have seeds for sale, for instance.). If you still can't find a germination rate for a particular species, then there probably just isn't any published data for that species, in which case, you can just put "Unknown."