Metadata

Garland Xie

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## To do list

* Add a figure for the systematic sampling design
* Add relevant citations
* Add metadata for each dataset:
  + fall\_seedbank.csv,
  + spring\_seedbank.csv,
  + taxonomic\_info.csv

## Experimental protocol

For the spring sampling season, we collected soil samples for a total of 81 1-m2 plots across nine sites in three different management regimes (i.e., seed drilling, undisturbed, and maintenance mow) in May 2021. Here, we located the centroid of each plot in the field using a handheld GPS (Garmin eTrex 10) At each plot, we measured a distance of 30 cm away from the centroid.

Before sampling, we removed the soil surface for any litter or gravel. We then took a soil sample using a 3.5-cm diameter soil core to a depth of 5 cm . This procedure was repeated five times to increase the precision and accuracy of the seed bank estimate and reduce the spatial autocorrelation of community abundance and species richness within plots.

We combined all five soil samples to a single composite sample per plot into a plastic bag. It is possible to obtain a complete picture of the community dynamics of the seed bank by sampling twice within a growing season such as the spring and fall season. We thus repeated this field measurement protocol for obtaining seed bank samples from October-November 2021.

Because fall samples require cold temperatures to break winter dormancy, all spring and fall samples were stored in a freezer at -20 ℃ for up to three weeks prior to processing at the greenhouse.

Prior to seed emergence methods, we processed soils to remove any litter, roots, rocks, or other debris using a 4 mm sieve. We then filled 81 plastic germination trays with 3 cm of sterilized potting soil. We then spread the field-collected soil samples (one composite sample per plot amounting to 240 cubic-centimeters of soil) evenly over the potting soil to ensure complete germination. To serve as a control to track any contaminated seeds from either the greenhouse environment or the potting soil itself, we filled five additional trays with sterilized potting soil and four additional trays with unsterilized potting (n = 9 for control treatments). All of the trays were randomly dispersed throughout the greenhouse bench.

To reduce any spatial effects of environmental heterogeneity (i.e., light intensity and temperature), we completely randomized the trays once a week. We also watered all the trays twice a week to ensure adequate moisture.

We monitored seed germination over a period of four months (July to October 2021). During this time, we scarified the soil if there was at least a week of no seed germination. Any species that were difficult to identify as either a seedling or a juvenile was also collected and placed into a separate tray and grown until flowering. After the fourth month, we removed all the remaining germinants. While previous seed bank studies suggests a monitoring period of six months is required, we were primarily interested in species that germinated first and most abundantly as these have competitive advantage in establishment as propagule pressure for both exotic and native plant species.

We plan to replicate the seedling emergence for the fall sampling season starting from November 2021 to February 2022.

## Metadata: Seedling emergents from the spring season

|  |  |  |  |
| --- | --- | --- | --- |
| Variable | Data type | Range | Description |
| Section | Factor | S2, S4 | Meadoway section |
| Site | Factor | DAVE, BNSH, GRNB, KENN, VICP, TIMH, DVAG, AMBJ, BRIM | Site name |
| Treatment | Factor | TIL, MOW, RES, STER, POTT | Treatment abbreviations: TIL = heavily tilled, MOW = maintenance mowing, RES = undisturbed, STER = sterilized soil, POTT = potting soil |
| Plot | Character | P01, P03, P05, P11, P13, P15, P21, P23, P25 | Plot ID |
| Date\_ymd | Date | N/A | Date of when seedling abundance was identified and recorded (using ISO 8601 format) |
| Spp\_code | Character | N/A | Code of genus-species taxonomic abbreviations |
| Abund | Integer | [0-500] | Seedling abundance |
| Sampled\_by | Character | DG, GX | Initials: Garland Xie (GX), Devlin Grewal (DG) |
| Comments | Character | N/A | Additional comments. Initials: Garland Xie (GX), Devlin Grewal (DG) |

## Metadata: Seedling emergents from the fall season

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| --- | --- | --- | --- |
| Variable | Data type | Range | Description |
| Season | Factor | Fall | Duration: December 2021 to March 2022 |
| Section | Factor | S2, S4 | Meadoway section |
| Site | Factor | DAVE, BNSH, GRNB, KENN, VICP, TIMH, DVAG, AMBJ, BRIM | Site name |
| Treatment | Factor | TIL, MOW, RES, STER, POTT | Treatment abbreviations: TIL = heavily tilled, MOW = maintenance mowing, RES = undisturbed, STER = sterilized soil, POTT = potting soil |
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