Collector bias in native and non-native herbarium specimens

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Introduction

- Herbarium specimens provide long-term, geolocated information about historical plant phenology, and increased digitization enables analysis at unprecedented scales.
- How might collector bias in herbarium specimens affect our ability to use these collections to conduct phenology research?

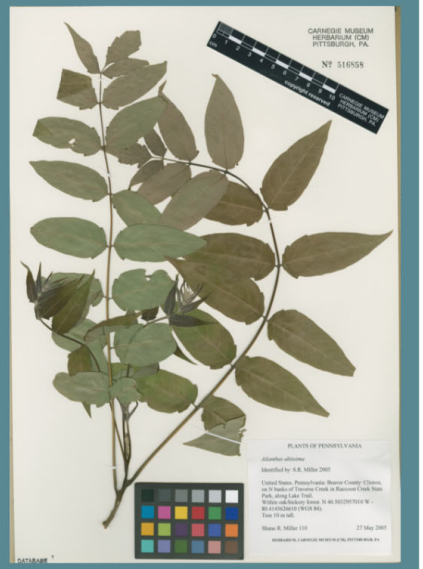
Methods

- We assessed over 3,600 Carnegie Museum of Natural History herbarium specimens collected from 1838 to 2017.
- We selected study species based on phylogenetically-related native and non-native species.
- We scored phenophase as leaf-out, flowering, fruiting, vegetative, or senescent based on methods from Everill *et al.* (2014).
- The study included 7 families, 15 species, and 3679 herbarium specimens.

Native herbs (n =1002)
Cardamine concatenata, Dicentra canadensis, Dicentra cucullaria, Sanguinaria canadensis

Native trees (n=1743)
Acer rubrum, Acer saccharum, Betula alleghaniensis, Betula lenta, Liriodendron tulipifera

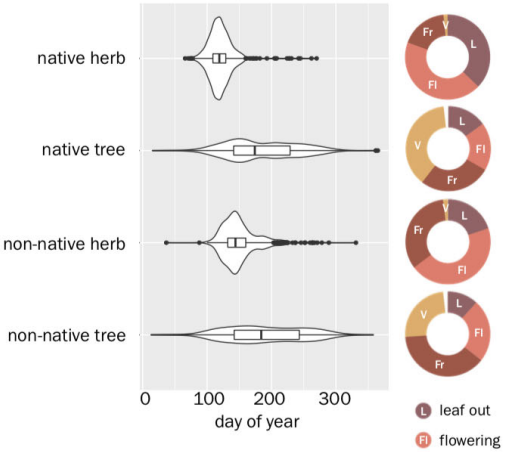
Non-native herbs (n=720)
Alliaria petiolata, Chelidonium majus, Hesperis matronalis



Non-native trees (n=214)
Acer platanoides, Ailanthus altissima, Paulownia tomentosa

Results

Collection date and phenophase



- Herbs are most likely to be collected early in the year during spring flowering, with natives collected earlier than non-natives.
- Non-native herbs are more likely to be collected while reproductive (flowering or fruiting) while native herbs are most likely to be collected while leafing out or flowering.
- Trees are collected much more uniformly throughout the year.

Discussion

- Collector bias may lead to the preservation of native plants at their highest aesthetic appeal (leaf-out, flowering) and non-native plants at reproductive phenophases (flowering, fruiting).
- No significant bias was found over the years in latitude or date of collection.

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References

Everill *et al.* 2014. *Am J Bot*.