



Investigating *Mordellina ancilla* as stem occupants of garlic mustard

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Introduction

Garlic Mustard (*Alliaria petiolata*):

- An invasive understory plant in North America with little native insect herbivory, attributed to chemicals it produces to inhibit organisms around it [1],[2]

Mordellina ancilla (Coleoptera: Mordellidae)

- A native beetle found to be occupants of garlic mustard stems in a mustard garlic biocontrol project of involving the weevil *Ceutorhynchus scrobicollis*

Research Questions

- What does *M. ancilla*'s **stem occupancy and life history** look like inside garlic mustard stems?
- Is *M. ancilla*'s stem occupancy **associated with any mustard stem characteristics**?

Methods

- Senesced garlic mustard stems were collected 3-5 times a month at a site at the Koffler Scientific Reserve (KSR) in King City from May to July 2022
- Stems were bisected
- Data collected:
 - Stem/root weight, length, and diameter
 - Visual changes/modifications to stem pith (from the usual white) and presence of larval frass
 - Presence and identity of occupants and their position inside the stem/root



The KSR sampling site with garlic mustard plants covering the ground



Senesced garlic mustard stems



Bisected stem with unmodified pith

Results

Stem Occupancy and Life History



17.61% of the 1164 total stems had at least 1 occupant. *M. ancilla* was the most common species found (n = 65), making up 29.82% of all occupants; found in 5.58% of all stems.

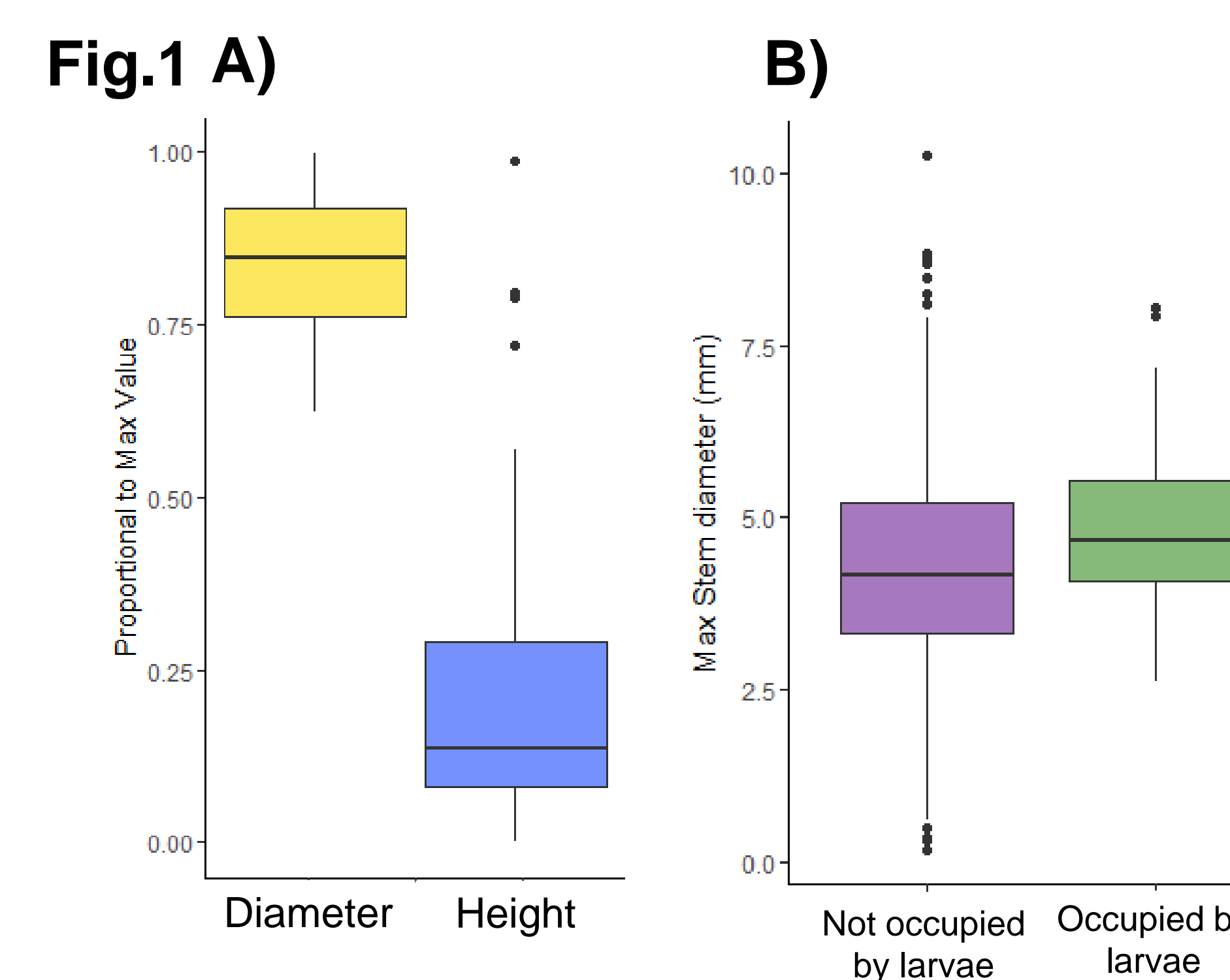


Fig.1. A) larvae were typically found near the bottom of stems where the diameter was larger and **B)** Stems occupied by larvae tended to have larger maximum diameters

A logistic regression showed that maximum diameter had a significant effect on presence of a larvae (p-value < 0.01)

Fig.2

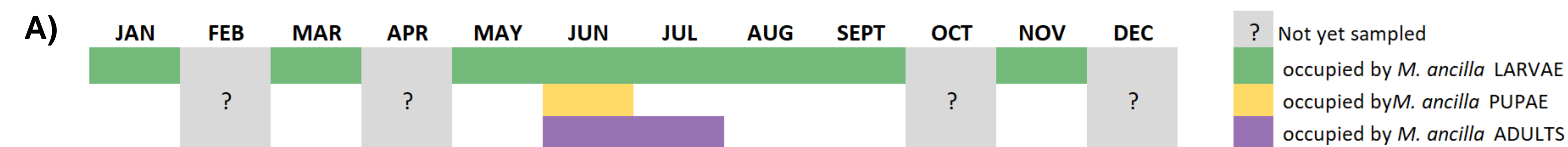
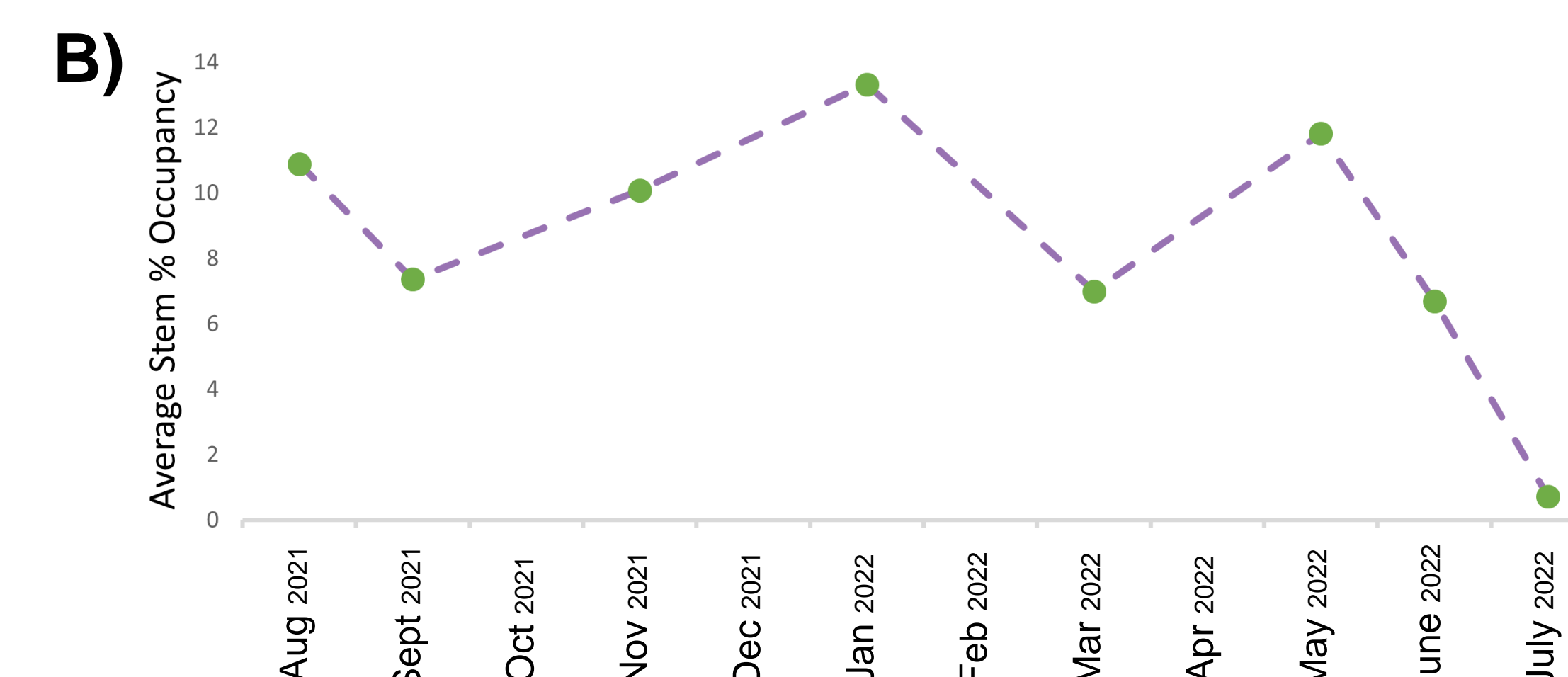


Fig.2. A) Months in which different life-stages of *M. ancilla* occupied mustard garlic stems and **B)** average % occupancy by month

Collection of 2022 senesced plant stems began in July 2022, previous collections were of 2021 plants

*Fig.2. combined this project's May-July 2022 data with similar data collected by Thomas C. Hall between Aug 2021-Apr 2022



Stem Characteristics

Fig.3

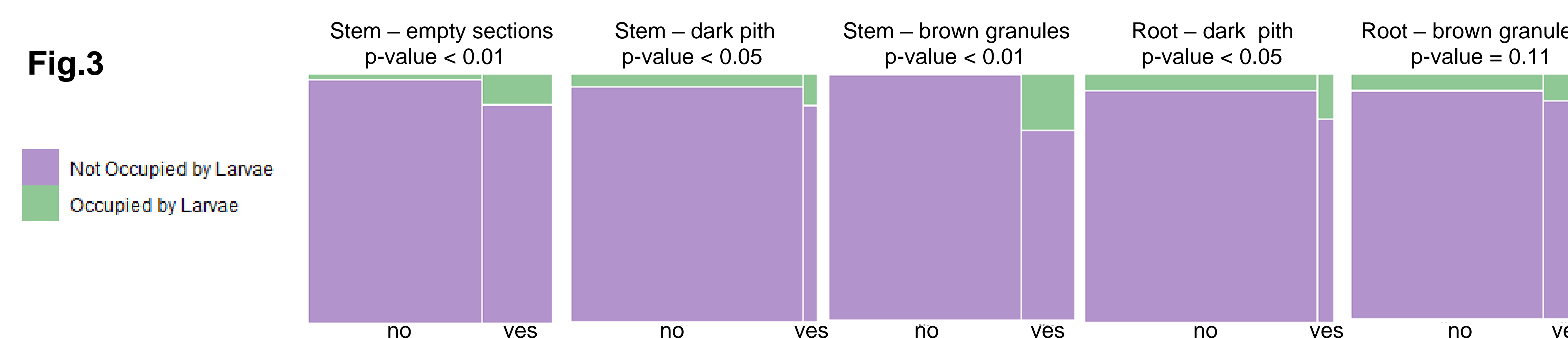


Fig.3. Chi-squared tests showed a significant correlation between larvae presence and empty stem sections, brown granules (frass) in the stem, and dark stem/root pith

Conclusions

- M. ancilla* is a common occupant of garlic mustard stems throughout the year
 - It is typically found in the lower sections of stems and sections of stem with a larger diameter, and is associated with several stem characteristics
 - This could have implications for how it circumvents the plant's chemical defenses and how it has come to utilise the non-native plant in general [2]
- Further knowledge of *M. ancilla*'s life history and mustard garlic in general could inform future biocontrol efforts

References

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[2]. Barto, E.K., Powell, J.R. & Cipollini, D. (2010). How novel are the chemical weapons of garlic mustard in North American forest understories?. *Biol Invasions* 12, 3465-3471.

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