

Supporting Information: Phenological responses to climate mediate seedling competition with an invasive woodland herb

Tables

Strat.	Inc.	Max germination % (sd)		Mean germination days (sd)	
		C. canadensis	H. matronalis	C. canadensis	H. matronalis
0	H	0.07 (0.1)	0.78 (0)	15.25 (0)	3.11 (0.6)
	L	0 (0)	0.75 (0.1)	—	4.59 (0.7)
2	H	0.03 (0)	1 (0)	9 (1)	2.3 (0.1)
	L	0.2 (0.2)	0.82 (0.1)	10.25 (0.3)	2.57 (0.5)
4	H	0.18 (0.1)	0.97 (0)	9.83 (3.6)	2.49 (0.3)
	L	0.58 (0.3)	0.82 (0.1)	11.06 (1.1)	3.5 (0.6)
5	H	0.08 (0.1)	1 (0)	8.44 (4.7)	2.33 (0.4)
	L	0.85 (0.1)	0.9 (0.1)	7.67 (0.5)	2.62 (0.6)
6	H	0.25 (0.2)	0.98 (0)	13.5 (6.9)	1.91 (0.2)
	L	0.77 (0.1)	0.97 (0.1)	8.11 (0.4)	2.14 (0.2)
7	H	0.6 (0)	0.87 (0)	5.81 (0.2)	2 (0)
	L	0.97 (0.1)	1 (0)	6.29 (0.2)	2.15 (0.2)
8	H	0.5 (0.1)	1 (0)	7.4 (0.3)	2.06 (0.2)
	L	0.98 (0)	0.95 (0)	6.09 (0.4)	1.94 (0.1)
9	H	0.6 (0.1)	0.98 (0)	5.22 (0.7)	1.74 (0.1)
	L	1 (0)	0.93 (0.1)	6.04 (0.5)	1.78 (0)
11	H	0.73 (0.2)	0.98 (0)	4.61 (0.2)	1.86 (0.1)
	L	0.93 (0.1)	0.93 (0.1)	5.04 (0.3)	2.11 (0.5)
13	H	0.77 (0.2)	0.88 (0)	4.14 (0.3)	1.89 (0.9)
	L	1 (0)	0.98 (0)	4.16 (0.2)	1.42 (0.3)

Table S1: Final germination percentages and mean germination time (and standard deviation among replicates) for focal species under all experimental treatment combinations. Incubation levels (Inc.) indicate mean temperature treatments of 20°C (H) or 15°C (L) respectively and stratification level (strat.) indicates the number of weeks of cold stratification at 4°C.

	Estimate	Est.Error	Q2.5	Q25	Q75	Q97.5
Intercept	2.59	0.25	2.10	2.41	2.76	3.09
n_{Cc}	-0.41	0.03	-0.47	-0.43	-0.38	-0.34
n_{Hm}	0.12	0.03	0.07	0.11	0.14	0.17
priority	0.15	0.03	0.08	0.13	0.17	0.21

Table S2: Mean effect size estimates of adding an additional individual of *C. canadensis* (n_{Cc}), *H. matronalis* (n_{Hm}), and one day difference in germination time between the two species in competition plots on relative growth rate difference (RGRD), with 50% and 95% uncertainty intervals.

Figures

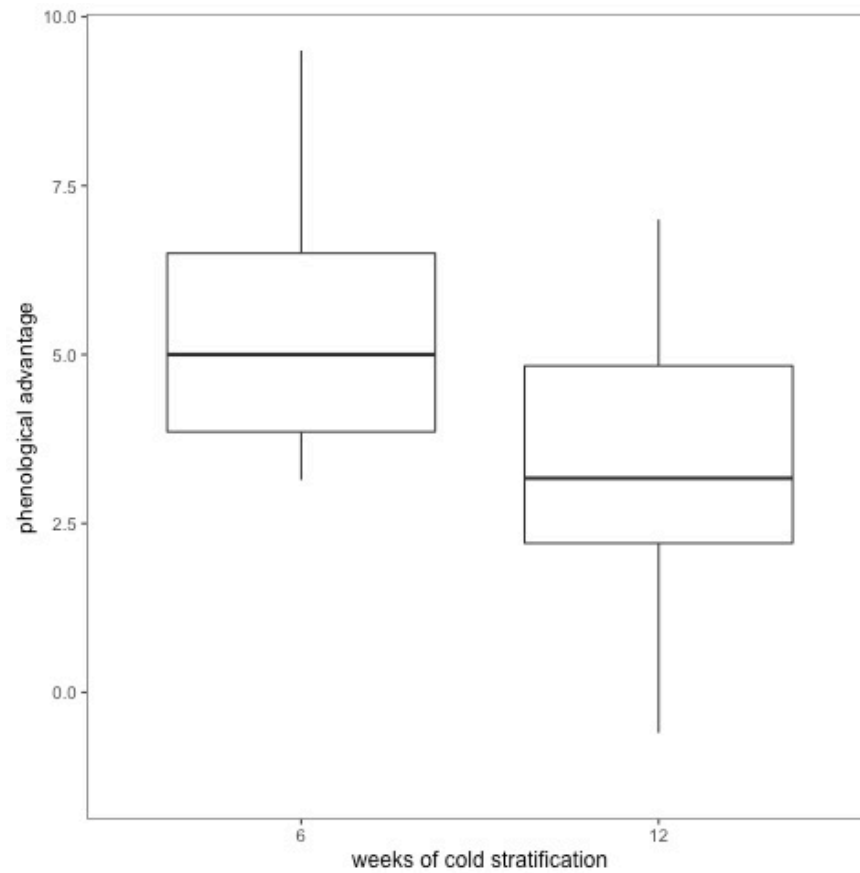


Figure S1: Differences in mean germination time (phenological advantage) between *Hesperis matronalis* and *Cryptotaenia canadensis* in each mixed-species pot under 6 and 12 weeks of cold stratification. Boxplots are based on raw data with middle bars indicating the median phenological advantage between the two species at each treatment level and the lower and upper hinges representing the 25% and 75% quantiles respectively

Measures of germination speed

There are important differences between time to 50% germination (t_{50}) and mean germination time (MGT) that make one or the other more appropriate for the two types of experiments we ran. t_{50} is an estimate of the time to 50% germination of all seeds planted, while mean germinating time (MGT) is a measure of the time to 50% germination of only individuals that actually germinated (Soltani *et al.*, 2015). In comparative germination assays, t_{50} is considered a better metric because it standardizes phenological estimates across variable germination fractions. In our competition trials, we only wanted to estimate the phenology of individuals that germinated, so we used MGT as our measure of germination phenology. Because MGT is sensitive to the final germination fraction, it is not surprising the MGT measurements in the competition trials were lower than the t_{50} estimates in the germination assays.

References

Soltani, E., Ghaderi-Far, F., Baskin, C.C. & Baskin, J.M. (2015) Problems with using mean germination time to calculate rate of seed germination. *Australian Journal of Botany* **63**, 631–635.