

Electronic Supplementary Material

Climate change, phenology and butterfly host plant utilization.

Jose A. Navarro-Cano, Bengt Karlsson, Diana Posledovich, Tenna Toftegaard, Christer Wiklund, Johan Ehrlén, Karl Gotthard

This supplementary material has not been peer reviewed.

Table S1 Principal component analysis (PCA) factor loadings for the three host plant traits measured to assess latitudinal variation in *A. cardamines* host plant use

	Rotated principal component	
	PC1	PC2
Phenological state	0.238	0.971
Plant size	0.838	-0.117
Inflorescence size	0.833	-0.160
Variance explained (%)	48.4	32.7

Table S2 Results of general linear models examining the effects of region, size and phenology, and their interactions on the probability of a plant individual being oviposited on (0 or 1) for seven host plant species. Effects significant at $P \leq 0.05$ are in bold

Species	Source of variation	Oviposition (Analysis of deviance)			
		df	Resid. df	Chi-square deviance	P
<i>Arabidopsis thaliana</i>	Region	2	1305	4.268	0.118
	Size	1	1304	49.598	<0.001
	Phenology	1	1303	1.711	0.191
	Region×Size	2	1301	8.859	0.012
	Region×Phenology	2	1299	0.096	0.953
	Size×Phenology	1	1298	10.817	<0.001
	Region×Size×Phenology	2	1296	5.460	0.065
<i>Thlaspi caerulescens</i>	Region	1	540	1.370	0.242
	Size	1	539	1.381	0.240
	Phenology	1	538	12.687	<0.001
	Region×Size	1	537	0.009	0.923
	Region×Phenology	1	536	9.189	0.002
	Size×Phenology	1	535	8.213	0.004
	Region×Size×Phenology	1	534	4.155	0.042
<i>Capsella bursa-pastoris</i>	Region	2	878	41.97	<0.001
	Size	1	877	41.50	<0.001
	Phenology	1	876	0.83	0.36
	Region×Size	2	874	3.37	0.19
	Region×Phenology	2	872	1.07	0.59
	Size×Phenology	1	871	14.06	<0.001
	Region×Size×Phenology	2	869	3.93	0.14
<i>Cardamine pratensis</i>	Region	2	828	55.55	<0.001
	Size	1	827	25.26	<0.001
	Phenology	1	826	4.55	0.03
	Region×Size	2	824	2.62	0.27
	Region×Phenology	2	822	7.82	0.02
	Size×Phenology	1	821	0.48	0.49
	Region×Size×Phenology	2	819	3.77	0.15
<i>Cardamine paludosa</i>	Region	2	1254	25.92	<0.001
	Size	1	1253	162.15	<0.001
	Phenology	1	1252	4.70	0.03
	Region×Size	2	1250	11.58	0.003
	Region×Phenology	2	1248	0.62	0.73
	Size×Phenology	1	1247	0.22	0.64
	Region×Size×Phenology	2	1245	5.00	0.08
<i>Arabis hirsuta</i>	Region	1	906	2.95	0.09
	Size	1	905	75.57	<0.001
	Phenology	1	904	1.99	0.16
	Region×Size	1	904	1.15	0.28
	Region×Phenology	1	903	2.83	0.09
	Size×Phenology	1	902	0.25	0.62
	Region×Size×Phenology	1	901	7.47	0.010

<i>Arabis glabra</i>	Region	1	454	47.110	<0.001
	Size	1	453	6.556	0.010
	Phenology	1	452	17.898	<0.001
	Region×Size	1	451	3.745	0.053
	Region×Phenology	1	450	1.758	0.185
	Size×Phenology	1	449	9.650	0.002
	Region×Size×Phenology	1	448	6.687	0.010

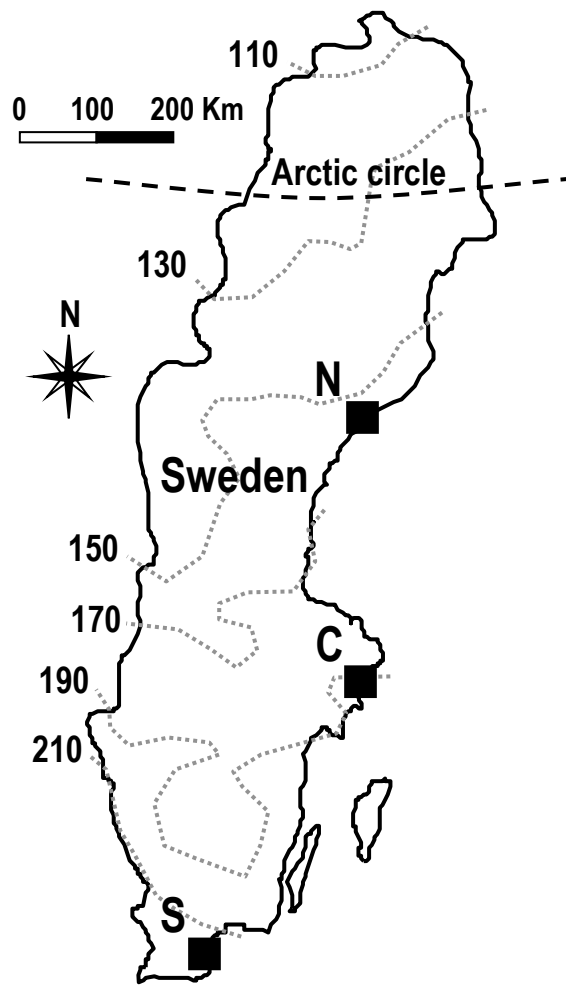


Fig S1 Sampling regions (south, central and north) along a south-north climatic gradient in Sweden and isoclines for the length of the climatic growing season in days (redrawn from Sjörs 1999).

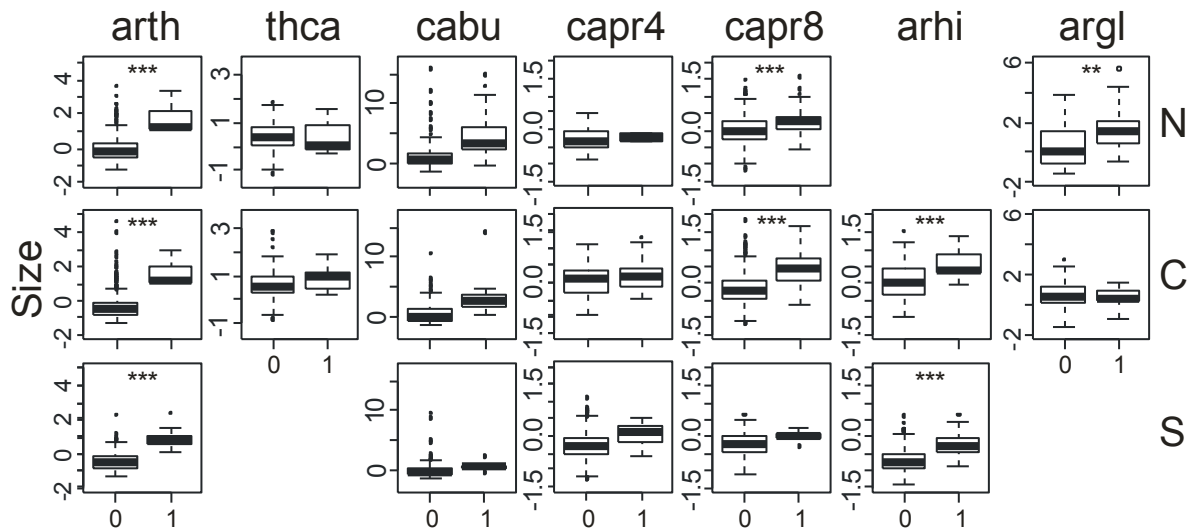


Fig. S2 Box-plots showing the effects of the predictor variable Size (PC1) on the oviposition (binary response variable; 0 = egg absence, 1 = presence) in the south (S), central (C) and north region (N). Significant effects of separate logistic regression models for the species with a significant interaction region \times size or region \times size \times phenology are indicated by asterisks in the upper part of each box-plot ($P \leq 0.05^*$, $P \leq 0.01^{**}$, $P \leq 0.001^{***}$). Note the among-species different scale. Box-plots showing the mean size (first axis from a PCA, see text) for plant individuals of seven different species and from three different regions that were either oviposited on by the butterfly *Anthocharis cardamines* (1) or that escaped attack (0). The seven host plant species were: arth = *Arabidopsis thaliana*), thca = *Thlaspi caerulescens*, cabu = *Capsella bursa-pastoris*, capr4 = *Cardamine pratensis*), capr8 = *Cardamine paludosa*, arhi = *Arabis hirsuta*, and argl = *Arabis glabra*. The three regions were: south (S), central (C) and north (N). Significant differences between groups are indicated by asterisks ($P \leq 0.05^*$, $P \leq 0.01^{**}$, $P \leq 0.001^{***}$). Note that scales differ among species.