SUPPLEMENTALS

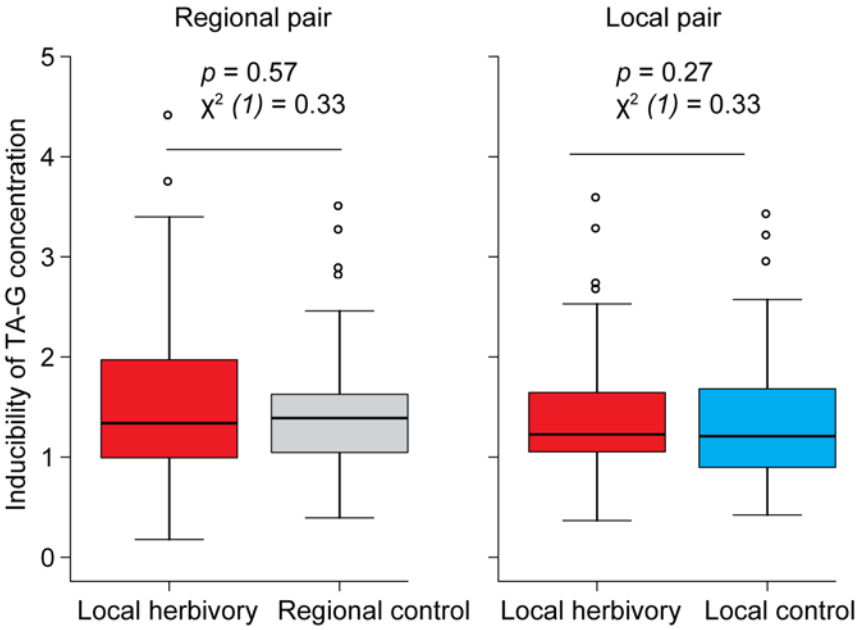

Figure S1. Inducibility of taraxinic acid β-D-glucopyranosyl ester (TA-G). Inducibility of TA-G (TA-G concentration herbivore-infested plant / TA-G concentration control plant) did not differ between infestation histories. Test statistics of Kruskal-Wallis rank sum tests are shown. Numbers in brackets show the degrees of freedom.

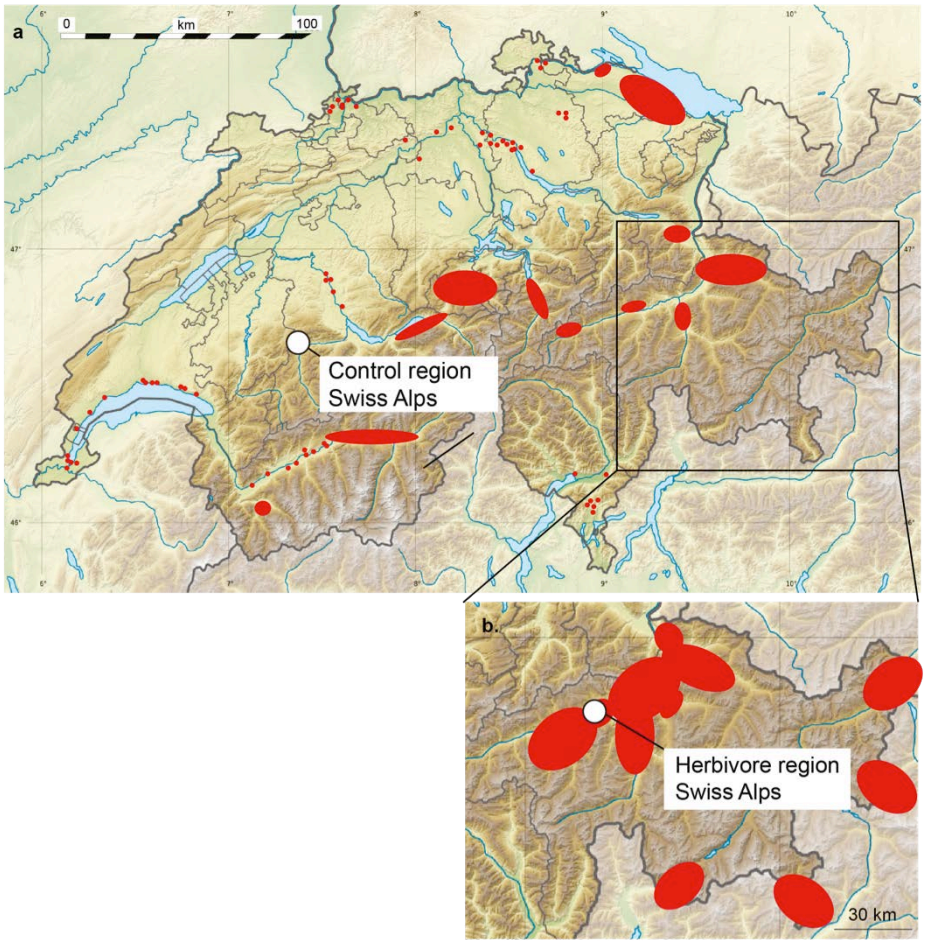

Figure S2. Distribution of *M. melolontha* in Switzerland. Red areas indicate high *M. melolontha* abundance. a. Overview of *M. melolontha* distribution in Switzerland according to data from 2007[1]. b. Approximate distribution o*f M. melolontha* according to data from the agricultural education and consulting centre Plantahof (Landquart, Switzerland) as recorded in 2008.

Table S1. Field sites of natural *T. officinale* populations. NA = no available information. DE = Germany; BE = Bernese. Cut = cutting.

Nr	Area	Region	Village	Infestation history	Record	Information source	GPS-N	GPS-E	Altitude (m)	Exposition	Inclination	Characterization	Land use
1	DE	Spessart	Mespelbrunn	Local herbivory	>20 years	Government bureau for viniculture in Kaiserstuhl; local farmer T. Hau and O. Fäth	49.9195	9.29467	372	North-west	slight slope	Extensively used grassland	Cut and occasional sheep grazing
2	DE	Spessart	Mespelbrunn	Local herbivory	>20 years	Government bureau for viniculture in Kaiserstuhl; local farmer T. Hau and O. Fäth	49.9140	9.29884	359	South-west	slope	Extensively used grassland	Hoarse grazing
3	DE	Spessart	Mespelbrunn	Local herbivory	>20 years	Government bureau for viniculture in Kaiserstuhl; local farmer T. Hau and O. Fäth	49.9097	9.29882	335	South	slope	Intermediately rich pasture	NA
4	DE	Spessart	Mespelbrunn	Local control	>20 years	Regional government bureau for viniculture in Kaiserstuhl; local farmer T. Hau and O. Fäth	49.9281	9.29368	369	West	slope	Extensively used grassland	Cut and occasional grazing
5	DE	Spessart	Mespelbrunn	Local control	>20 years	Regional government bureau for viniculture in Kaiserstuhl; local farmer T. Hau and O. Fäth	49.9282	9.2908	326	North	slope	Intermediately rich pasture	Cut and occasional grazing
6	DE	Spessart	Mespelbrunn	Local control	>20 years	Regional government bureau for viniculture in Kaiserstuhl; local farmer T. Hau and O. Fäth	49.9113	9.28641	359	South	slope	Intermediately rich pasture	Hoarse or sheep grazing
7	DE	Würzburg	Würzburg	Regional control	>20 years	Regional government bureau for viniculture in Kaiserstuhl	49.7210	9.7307	283	South	slope	Extensively used grassland	Occasional grazing or cut
8	DE	Würzburg	Würzburg	Regional control	>20 years	Regional government bureau for viniculture in Kaiserstuhl	49.73665	9.60355	345	East	slope	Extensively used grassland	Occasional grazing or cut
9	DE	Würzburg	Würzburg	Regional control	>20 years	Regional government bureau for viniculture in Kaiserstuhl	49.7258	9.65052	323	South-east	slope	Extensively used grassland	Occasional grazing or cut
10	Swiss Alps	Graubünden	Ruschein	Local herbivory	>20 years	Regional educational center for agriculture, Plantahof; local farmer C. Guisep	46.7813	9.17917	944	South	slope	Rich pasture	Cut and autumn cow grazing
11	Swiss Alps	Graubünden	Valendas	Local herbivory	>20 years	Regional educational center for agriculture, Plantahof; local farmer P. Beeli	46.7888	9.28285	830	South-east	slight slope	Rich pasture	Cut and autumn cow grazing
12	Swiss Alps	Graubünden	Valendas	Local herbivory	>20 years	Regional educational center for agriculture, Plantahof; local farmer P. Beeli	46.7892	9.28346	829	South	slope	Nutrient-poor grassland	Cut
13	Swiss Alps	Graubünden	Luven	Local herbivory	>20 years	Regional educational center for agriculture, Plantahof; local farmer M. Bühler	46.75860	9.20514	854	North-east	slope	Relatively nutrient poor meadow	Cut
14	Swiss Alps	Graubünden	Ruschein	Local control	NA	Regional educational center for agriculture, Plantahof; local farmer C. Pieder	46.7832	9.19936	1061	South	slope	Rich pasture	Cut and autumn cow grazing
15	Swiss Alps	Graubünden	Valendas	Local control	>20 years	Regional educational center for agriculture, Plantahof; local farmer P. Beeli	46.7897	9.28363	842	South	slight slope	Rich pasture	Cut
16	Swiss Alps	Graubünden	Valendas	Local control	>20 years	Regional educational center for agriculture, Plantahof; local farmer P. Beeli	46.7894	9.28338	841	NA	flat	Rich pasture	Cut
17	Swiss Alps	Graubünden	Luven	Local control	>20 years	Regional educational center for agriculture, Plantahof; local farmer M. Bühler	46.7583	9.20533	858	North-east	slope	Rich pasture	Cut
18	Swiss Alps	BE Highlands	Adlemsried	Regional control	>20 years	Abundance map *M. melolontha*; local farmer U. Erb	46.6375	7.39325	1031	South	slope	Rich pasture	Cut and autumn cow grazing
19	Swiss Alps	BE Highlands	Adlemsried	Regional control	>20 years	Abundance map *M. melolontha*; local farmer U. Erb	46.6306	7.39423	846	South-east	slope	Rich pasture	Cow grazing
20	Swiss Alps	BE Highlands	Adlemsried	Regional control	>20 years	Abundance map *M. melolontha*; local farmer U. Erb	46.63165	7.38579	935	East	slope	Intermediately rich pasture	Cut and autumn cow grazing
21	Swiss Alps	BE Highlands	Adlemsried	Regional control	NA	Abundance map *M. melolontha*; local farmer U. Erb	46.6191	7.38262	828	NA	flat	Rich pasture	Cut

Table S2. Test statistics of Kruskal-Wallis rank sum tests for variation in root herbivore abundance between infestation histories. Number in brackets shows degrees of freedom. Significant tests are denoted with asterisks. * $p < 0.05$; ** $p < 0.01$, *** $p < 0.001$.

	M. melolontha	White grubs excl. *M. melolontha*	Wireworms
Germany	$\chi^2(2) = 6.5$ *	$\chi^2(2) = 0.1$	$\chi^2(2) = 1.7$
Swiss Alps	$\chi^2(2) = 14.3$ ***	$\chi^2(2) = 0.5$	$\chi^2(2) = 0.002$

Table S3. Test statistics of likelihood ratio tests between mixed effect models with and without infestation history as fixed effects. TA-G = taraxinic acid β-D-glucopyranosyl ester; PIEs = phenolic inositol esters; TritAcs = triterpene acetates; *df* = degree of freedom.

	TA-G		**Total PIEs**		**Total TritAcs**	
	χ^2 (*df*)	*P*-value	χ^2 (*df*)	*P*-value	χ^2 (*df*)	*P*-value
Germany	19.2 (*2*)	0.0001	9.93 (*2*)	0.07	8.01 (*2*)	0.02
Swiss Alps	13.2 (*2*)	0.001	8.73 (*2*)	0.01	9.18 (*2*)	0.046

Table S4. Analysis of directional selection of *M. melolontha* on latex secondary metabolites without individuals with TA-G concentration > 100 µg per mg latex. Relative fitness was analysed as a function of latex secondary metabolites in the absence and presence of *M. melolontha*. Significant interaction terms indicate that *M. melolontha* exerts selection on the metabolite. ** $p < 0.01$.

	Estimate	**Standard error**	***P*-value**
Herbivory	-0.98	0.88	0.27
TAG	-0.029	0.01	0.003 **
Total PIEs	0.005	0.007	0.44
Total TritAc	0.0001	0.007	0.99
Herbivory:TAG	0.036	0.013	0.005 **
Herbivory:Total PIEs	-0.006	0.01	0.62
Herbivory:Total TritAc	-0.002	0.01	0.87

Table S5. Directional (β) and stabilizing/disruptive (γ) selection gradients from offspring analysis for taraxinic acid β-D-glucopyranosyl ester (TA-G), total phenolic inositol ester (PIE) and total triterpene acetate (TritAc) concentrations. Standard errors are in parentheses. ** $p < 0.01$, * $p < 0.05$; . $p < 0.1$.

Latex metabolite	**Control**		***M. melolontha***	
	β	γ	β	γ
TA-G	-0.025 (0.008) **	-0.0001 (0.0003)	0.013 (0.007) .	-0.00008 (0.0003)
Total PIEs	-0.005 (0.006)	-0.0001 (0.0001)	0.008 (0.007)	0.0002 (0.0002)
Total TritAcs	-0.005 (0.009)	-0.0004 (0.0004)	-0.001 (0.008)	0.0006 (0.0004)

References

1 Keller, S. & Stutz, C. J. in *AGFF-Informationsblätter: Ratgeber für den ÖLN- und Bio-Futterbau* (AGFF, Arbeitsgemeinschaft zur Förderung des Futterbaues, 2007).