

Appendix 5a. The effect of elevated CO₂ on herbivore responses. The fail safe ratio is the fail safe number/(5n+10), where n is the sample size, and a ratio <1 fails Rosenthal's test (see main text). For each variable, the Z-test tests the hypothesis that the effect size is zero. Since many of the responses to elevated CO₂ have directional hypotheses, we present here both the 1-tailed and 2-tailed probabilities for the z-test, though significant results presented in the text are based on the 2-tailed probabilities. Yellow shading indicates variables for which the effect size is significantly different from zero (two-tailed test) AND the fail safe ratio is >1.

Variable	Cumulative effect size	df	95% CI	SE	z	P (1-tailed)	P (2-tailed)	Fail safe number	5n+10	Fail safe ratio
Relative growth rate	-0.045	106	-0.0600 to -0.0305	0.0075	-6.020	0.000	0.000	1515.7	545	2.8
Mean relative growth rate	-0.116	8	-0.1999 to -0.0317	0.0429	-2.699	0.003	0.007	19.8	55	0.4
Growth rate	-0.059	22	-0.1605 to 0.0425	0.0518	-1.139	0.127	0.255	0	125	0.0
Relative consumption rate	0.140	94	0.1086 to 0.1708	0.0159	8.804	0.000	0.000	2392.4	485	4.9
Absolute consumption rate	0.109	23	0.0037 to 0.2132	0.0534	2.030	0.021	0.042	18.2	130	0.1
Relative consumption	0.121	15	0.0084 to 0.2339	0.0575	2.107	0.018	0.035	0	90	0.0
Total consumption	0.167	91	0.1163 to 0.2167	0.0256	6.501	0.000	0.000	1218.8	470	2.6
Conversion efficiency – ingested	-0.166	74	-0.1969 to -0.1352	0.0157	-10.547	0.000	0.000	3398.6	385	8.8
Conversion efficiency – digested	-0.122	57	-0.1830 to -0.0615	0.0310	-3.943	0.000	0.000	330.2	300	1.1
Approximate digestibility	0.030	67	-0.0005 to 0.0602	0.0155	1.931	0.027	0.053	41.9	350	0.1
Larval/nymphal weight	-0.010	62	-0.1180 to 0.0981	0.0551	-0.180	0.429	0.857	0	325	0.0
Pupal weight	-0.056	55	-0.0809 to -0.0302	0.0129	-4.299	0.000	0.000	387.1	290	1.3
Adult weight	-0.054	35	-0.0922 to -0.0159	0.0195	-2.774	0.003	0.006	63.6	190	0.3
Development time	0.035	153	0.0239 to 0.0461	0.0057	6.180	0.000	0.000	2032.8	780	2.6
Life span	0.003	7	-0.0846 to 0.0905	0.0447	0.067	0.473	0.946	0	50	0.0
Fecundity	-0.031	56	-0.0782 to 0.0161	0.0241	-1.293	0.098	0.196	0	295	0.0
Rate of parasitism/predation	0.064	8	-0.1441 to 0.2729	0.1064	0.605	0.272	0.545	0	55	0.0
Survival	-0.026	23	-0.0909 to 0.0392	0.0332	-0.780	0.218	0.435	0	130	0.0
Abundance	0.047	86	-0.0647 to 0.1577	0.0567	0.820	0.206	0.412	0	445	0.0
Relative damage	-0.224	59	-0.3362 to -0.1115	0.0573	-3.904	0.000	0.000	356.5	310	1.2

Appendix 5b. The effect of elevated CO2 on herbivore responses for different herbivore orders. E+ = effect size, QB = between group heterogeneity, QW = within group heterogeneity, Prob (QB) = test of between-group variation using chi-square distribution, Prob (QW) = test of within-group variation using chi-square distribution. For each variable, the significance of the QB value indicates that the orders differ from each other in their responses. To help elucidate the source of that variation, individual Z-tests were performed for each order, to test whether that order's response differed from zero. Since many of the responses to elevated CO2 have directional hypotheses, we present here both the 1-tailed and 2-tailed probabilities for the z-test, though significant results presented in the text are based on the 2-tailed probabilities. Green shading denotes response variables which exhibit significant variation between orders. Orders highlighted in red font had effect sizes different from zero (two-tailed test).

Variable	QB df	QB	Prob (QB)	QW df	QW	Prob (QW)	Order	E+	df	95% CI	SE	Z	P (1-tailed)	P (2-tailed)
Relative growth rate	6	13.036	0.042	100	248.755	0.000	Coleoptera	-0.006	6	-0.0571 to 0.0454	0.0261	-0.222	0.412	0.824
							Diptera	0.065	3	-0.1085 to 0.2375	0.0883	0.731	0.232	0.465
							Homoptera	-0.022	2	-0.1922 to 0.1490	0.0870	-0.248	0.402	0.804
							Hymenoptera	0.004	3	-0.1535 to 0.1608	0.0802	0.046	0.482	0.963
							Isopoda	-0.953	2	-3.6863 to 1.7813	1.3948	-0.683	0.247	0.495
							Lepidoptera	-0.056	77	-0.0725 to -0.0399	0.0083	-6.758	0.000	0.000
							Orthoptera	0.011	7	-0.2585 to 0.2796	0.1373	0.076	0.470	0.939
Mean relative growth rate	1	5.989	0.014	7	6.130	0.525	Homoptera	0.015	3	-0.1910 to 0.2215	0.1052	0.145	0.442	0.884
							Lepidoptera	-0.163	4	-0.2537 to -0.0714	0.0465	-3.494	0.000	0.000
Growth rate	2	0.273	0.872	20	15.606	0.741	Hymenoptera	-0.093	1	-2.4821 to 2.2962	1.2190	-0.076	0.470	0.939
							Lepidoptera	-0.064	18	-0.1781 to 0.0493	0.0580	-1.110	0.133	0.267
							Orthoptera	0.020	1	-2.0685 to 2.1082	1.0655	0.019	0.493	0.985
Relative consumption rate	4	13.383	0.010	89	190.494	0.000	Coleoptera	0.203	5	0.0621 to 0.3443	0.0720	2.823	0.002	0.005
							Hymenoptera	0.131	1	-1.0117 to 1.2732	0.5829	0.224	0.411	0.823
							Isopoda	0.023	21	-0.0899 to 0.1350	0.0574	0.394	0.347	0.694
							Lepidoptera	0.140	61	0.1043 to 0.1753	0.0181	7.719	-0.000	-0.000
							Orthoptera	0.553	1	-1.3862 to 2.4931	0.9896	0.559	0.288	0.576
Absolute consumption rate	2	0.261	0.878	21	16.724	0.728	Hymenoptera	0.030	1	-2.2186 to 2.2778	1.1470	0.026	0.490	0.979
							Lepidoptera	0.120	19	-0.0006 to 0.2403	0.0615	1.949	0.026	0.051
							Orthoptera	0.081	1	-2.2308 to 2.3925	1.1794	0.069	0.473	0.945
Relative consumption	3	4.783	0.188	12	17.347	0.137	Diptera	0.212	1	-1.6505 to 2.0741	0.9502	0.223	0.412	0.824
							Gastropoda	0.075	2	-2.1644 to 2.3136	1.1423	0.065	0.474	0.948
							Isopoda	-0.141	2	-0.7059 to 0.4250	0.2885	-0.487	0.313	0.626
							Lepidoptera	0.168	7	0.0017 to 0.3334	0.0846	1.981	0.024	0.048
Total consumption	2	0.947	0.623	87	102.762	0.119	Coleoptera	0.145	10	-0.0322 to 0.3217	0.0903	1.603	0.054	0.109
							Lepidoptera	0.174	72	0.1197 to 0.2286	0.0278	6.267	0.000	0.000
							Orthoptera	0.004	5	-0.4660 to 0.4731	0.2396	0.015	0.494	0.988
Conversion efficiency – ingested	3	1.655	0.647	71	185.805	0.000	Coleoptera	-0.124	6	-0.2573 to 0.0089	0.0679	-1.829	0.034	0.067
							Hymenoptera	-0.161	2	-0.5076 to 0.1867	0.1771	-0.906	0.182	0.365
							Lepidoptera	-0.173	62	-0.2062 to -0.1393	0.0171	-10.119	0.000	0.000
							Orthoptera	-0.065	1	-1.4246 to 1.2954	0.6939	-0.093	0.463	0.926
Conversion efficiency – digested	1	0.083	0.773	55	105.782	0.000	Lepidoptera	-0.123	54	-0.1847 to -0.0607	0.0316	-3.879	0.000	0.000
							Orthoptera	-0.073	1	-2.2275 to 2.0814	1.0992	-0.066	0.474	0.947
Approximate digestibility	1	0.026	0.873	65	90.889	0.019	Lepidoptera	0.031	64	0.0001 to 0.0619	0.0158	1.966	0.025	0.049
							Orthoptera	0.047	1	-1.1952 to 1.2889	0.6337	0.074	0.471	0.941
Larval/nymphal weight	2	0.675	0.714	60	38.152	0.988	Coleoptera	-0.033	6	-0.4264 to 0.3599	0.2006	-0.166	0.434	0.868
							Homoptera	-0.263	1	-4.3592 to 3.8334	2.0899	-0.126	0.450	0.900
							Lepidoptera	0.002	53	-0.1170 to 0.1202	0.0605	0.026	0.489	0.979
Pupal weight	2	2.830	0.243	53	60.471	0.224	Coleoptera	0.026	1	-1.2404 to 1.2914	0.6459	0.039	0.484	0.969
							Diptera	-0.129	2	-0.3461 to 0.0888	0.1109	-1.160	0.123	0.246
							Lepidoptera	-0.052	50	-0.0782 to -0.0257	0.0134	-3.883	0.000	0.000
Adult weight	4	3.109	0.540	31	46.863	0.034	Coleoptera	-0.020	1	-1.1965 to 1.1566	0.6003	-0.033	0.487	0.974
							Diptera	-0.008	3	-0.2705 to 0.2539	0.1338	-0.062	0.475	0.951
							Homoptera	-0.024	13	-0.0914 to 0.0444	0.0346	-0.678	0.249	0.498
							Gastropoda	-0.036	2	-0.5107 to 0.4385	0.2421	-0.149	0.441	0.881
							Lepidoptera	-0.093	12	-0.1572 to -0.0281	0.0329	-2.812	0.002	0.005
Development time	4	35.611	0.000	149	193.201	0.009	Coleoptera	0.006	5	-0.0605 to 0.0726	0.0340	0.180	0.429	0.857
							Diptera	-0.009	5	-0.0977 to 0.0807	0.0455	-0.187	0.426	0.852
							Homoptera	-0.028	24	-0.0546 to -0.0018	0.0135	-2.094	0.018	0.036
							Lepidoptera	0.051	114	0.0394 to 0.0631	0.0060	8.485	0.003	0.006
							Orthoptera	0.141	1	-1.2280 to 1.5090	0.6982	0.201	0.420	0.841
Life span	1	76.008	0.000	6	5.994	0.424	Homoptera	-0.044	5	-0.0720 to -0.0160	0.0143	-3.080	0.001	0.002
							Lepidoptera	0.123	1	-0.0773 to 0.3233	0.1022	1.204	0.114	0.229
Fecundity	5	72.173	0.000	50	77.341	0.008	Acarina	0.096	4	-0.0764 to 0.2690	0.0881	1.093	0.137	0.274
							Coleoptera	-0.130	9	-0.2050 to -0.0547	0.0383	-3.388	0.000	0.001
							Diptera	0.054	1	-3.0307 to 3.1395	1.5740	0.035	0.486	0.972
							Homoptera	0.085	22	0.0410 to 0.1288	0.0224	3.791	0.000	0.000
							Lepidoptera	-0.131	11	-0.1895 to -0.0722	0.0299	-4.374	0.000	0.000
							Orthoptera	-0.341	3	-0.5953 to -0.0859	0.1299	-2.621	0.004	0.009
Rate of parasitism/predation (Herb	1	0.616	0.432	7	8.541	0.287	Homoptera	0.036	4	-0.2563 to 0.3289	0.1493	0.243	0.404	0.808
							Lepidoptera	0.243	3	-0.5235 to 1.0087	0.3909	0.621	0.267	0.535
Rate of parasitism/predation (Pred,	1	0.005	0.944	5	4.215	0.519	Coleoptera	0.025	1	-0.7835 to 0.8334	0.4125	0.061	0.476	0.952
							Hymenoptera	0.041	4	-0.5680 to 0.6499	0.3107	0.132	0.448	0.895
Survival	3	32.715	0.000	20	23.213	0.278	Coleoptera	-0.026	2	-0.5064 to 0.4552	0.2453	-0.104	0.458	0.917
							Diptera	-0.223	1	-2.4634 to 2.0171	1.1430	-0.195	0.423	0.845
							Homoptera	0.156	2	0.0103 to 0.3010	0.0742	2.100	0.018	0.036
							Lepidoptera	-0.069	15	-0.1157 to -0.0223	0.0238	-2.896	0.002	0.004
Abundance	5	51.258	0.000	79	97.638	0.076	Acarina	0.592	6	0.1570 to 1.0265	0.2218	2.668	0.004	0.008
							Coleoptera	0.342	2	-0.8456 to 1.5295	0.6059	0.564	0.286	0.572
							Gastropoda	-0.147	1	-4.4447 to 4.1499	2.1925	-0.067	0.473	0.946
							Homoptera	0.220	40	0.0668 to 0.3722	0.0779	2.817	0.002	0.005
							Lepidoptera	-0.645	25	-0.8902 to -0.4005	0.1249	-5.166	0.000	0.000
							Thysanoptera	-0.170	5	-0.6517 to 0.3122	0.2459	-0.691	0.245	0.490
Relative damage	2	4.435	0.109	15	22.884	0.087	Coleoptera	0.026	3	-0.6205 to 0.6718	0.3297	0.078	0.469	0.938
							Gastropoda	-0.286	5	-0.8940 to 0.3212	0.3100	-0.924	0.178	0.356
							Lepidoptera	-0.526	7	-0.9179 to -0.1341	0.1999	-2.631	0.004	0.009

Appendix 5c. The effect of elevated CO2 on herbivore responses for different herbivore feeding guilds. E+ = effect size, QB = between group heterogeneity, QW = within group heterogeneity, Prob (QB) = test of between-group variation using chi-square distribution, Prob (QW) = test of within-group variation using chi-square distribution. For each variable, the significance of the QB value indicates that the guilds differ from each other in their responses. To help elucidate the source of that variation, individual Z-tests were performed for each guild to test whether that guild's response differed from zero. Since many of the responses to elevated CO2 have directional hypotheses, we present here both the 1-tailed and 2-tailed probabilities for the z-test, though significant results presented in the text are based on the 2-tailed probabilities. Green shading denotes guilds where there was significant between-guild variation. Guilds highlighted in red font had effect sizes different from zero (two-tailed test).

Variable	QB df	QB	Prob (QB)	QW df	QW	Prob (QW)	Guild	E+	df	95% CI	SE	z	P (1-tailed)	P (2-tailed)
Relative growth	2	4.028	0.133	104	255.602	0.000	Foliage feeder	-0.0481	96	-0.0632 to -0.0330	0.0077	-6.243	-0.000	-0.000
							Phloem feeder	-0.0216	2	-0.1938 to 0.1507	0.0879	-0.246	0.403	0.806
							Decomposer	0.057	6	-0.0761 to 0.1901	0.0679	0.839	0.201	0.401
Mean relative	1	5.989	0.014	7	6.130	0.525	Foliage feeder	-0.1625	4	-0.2537 to -0.0714	0.0465	-3.494	0.000	0.000
							Phloem feeder	0.0153	3	-0.1910 to 0.2215	0.1052	0.145	0.442	0.884
Relative consumption	1	5.074	0.024	92	198.300	0.000	Decomposer	0.0226	21	-0.0900 to 0.1352	0.0574	0.393	0.347	0.694
							Foliage feeder	0.1501	71	0.1171 to 0.1831	0.0168	8.915	0.000	0.000
Relative consumption	2	4.791	0.091	13	17.695	0.169	Decomposer	-0.1373	2	-0.6957 to 0.4211	0.2849	-0.482	0.315	0.630
							Foliage feeder	0.1665	10	0.0139 to 0.3191	0.0779	2.139	0.016	0.032
							Leaf-miner	0.2116	1	-1.6268 to 2.0500	0.9380	0.226	0.411	0.822
Total consumption	1	0.088	0.767	90	103.908	0.150	Foliage feeder	0.1634	77	0.1087 to 0.2181	0.0279	5.855	0.000	0.000
							Leaf-miner	0.1846	13	0.0416 to 0.3276	0.0730	2.530	0.006	0.011
Larval/nymph	1	0.647	0.421	61	39.004	0.987	Phloem feeder	-0.2632	1	-4.3212 to 3.7949	2.0704	-0.127	0.449	0.899
							Foliage feeder	-0.0025	60	-0.1123 to 0.1074	0.0560	-0.045	0.482	0.964
Pupal weight	1	1.411	0.235	53	60.825	0.215	Foliage feeder	-0.049	49	-0.0761 to -0.0218	0.0139	-3.537	0.000	0.000
							Leaf-miner	-0.0991	4	-0.2099 to 0.0118	0.0566	-1.752	0.040	0.080
Adult weight	3	2.457	0.483	32	48.201	0.033	Phloem feeder	-0.0234	13	-0.0908 to 0.0439	0.0344	-0.681	0.248	0.496
							Foliage feeder	-0.08	14	-0.1422 to -0.0178	0.0317	-2.521	0.006	0.012
							Leaf-miner	-0.1008	2	-0.4259 to 0.2243	0.1659	-0.608	0.272	0.543
							Decomposer	-0.0085	3	-0.2696 to 0.2527	0.1332	-0.064	0.475	0.949
Development	3	33.996	0.000	149	190.002	0.013	Foliage feeder	0.0507	115	0.0387 to 0.0627	0.0061	8.281	0.000	0.000
							Phloem feeder	-0.0282	24	-0.0548 to -0.0015	0.0136	-2.074	0.019	0.038
							Leaf-miner	0.0153	7	-0.0376 to 0.0683	0.0270	0.566	0.286	0.571
							Decomposer	-0.0716	3	-0.2818 to 0.1385	0.1072	-0.668	0.252	0.504
Life span	1	76.008	0.000	6	5.994	0.424	Foliage feeder	0.123	1	-0.0773 to 0.3233	0.1022	1.204	0.114	0.229
							Phloem feeder	-0.044	5	-0.0720 to -0.0160	0.0143	-3.080	0.001	0.002
Fecundity	3	65.624	0.000	53	83.769	0.004	Foliage feeder	-0.1436	26	-0.1850 to -0.1023	0.0211	-6.807	-0.000	-0.000
							Phloem feeder	0.0849	22	0.0410 to 0.1288	0.0224	3.791	0.000	0.000
							Scraper	0.0963	4	-0.0764 to 0.2691	0.0881	1.093	0.137	0.275
							Decomposer	0.0544	1	-3.0308 to 3.1397	1.5741	0.035	0.486	0.972
Rate of parasitism	2	5.021	0.081	6	4.675	0.586	Phloem feeder	0.0279	4	-0.1469 to 0.2026	0.0892	0.313	0.377	0.754
							Leaf-miner	1.2026	1	-5.4309 to 7.8361	3.3844	0.355	0.361	0.722
							Foliage feeder	-0.0012	1	-3.2478 to 3.2453	1.6564	-0.001	0.500	0.999
Rate of parasitism	1	0.687	0.407	7	8.480	0.292	Parasitoid	0.2259	5	-0.3195 to 0.7713	0.2783	0.812	0.208	0.417
							Predator	0.0287	2	-0.4345 to 0.4918	0.2363	0.121	0.452	0.903
Survival	3	32.746	0.000	20	23.318	0.273	Foliage feeder	-0.0665	16	-0.1126 to -0.0204	0.0235	-2.827	0.002	0.005
							Phloem feeder	0.1557	2	0.0106 to 0.3007	0.0740	2.104	0.018	0.035
							Leaf-miner	-0.1004	1	-1.8000 to 1.5991	0.8671	-0.116	0.454	0.908
							Decomposer	-0.2231	1	-2.4631 to 2.0168	1.1428	-0.195	0.423	0.845
Abundance	5	50.011	0.000	79	98.883	0.065	Phloem feeder	0.2195	40	0.0668 to 0.3722	0.0779	2.817	0.002	0.005
							Cell-feeder	-0.1182	3	-0.8624 to 0.6260	0.3797	-0.311	0.378	0.756
							Scraper	0.5918	6	0.1570 to 1.0265	0.2218	2.668	0.004	0.008
							Foliage feeder	0.0166	6	-0.4158 to 0.4490	0.2206	0.075	0.470	0.940
							Leaf-miner	-0.695	20	-0.9631 to -0.4269	0.1368	-5.081	0.000	0.000
							Leaf-tiers	-0.3509	4	-1.2200 to 0.5182	0.4434	-0.791	0.214	0.429
Relative damage	1	7.937	0.005	16	24.812	0.073	Foliage feeder	-0.0548	10	-0.3253 to 0.2157	0.1380	-0.397	0.346	0.691
							Leaf-miner	-0.6286	6	-1.0288 to -0.2284	0.2042	-3.079	0.001	0.002