

Supplementary Information for:

Title: Wildfire ash exposure reveals a disconnect between herbivore feeding behavior and fitness outcomes

Authors

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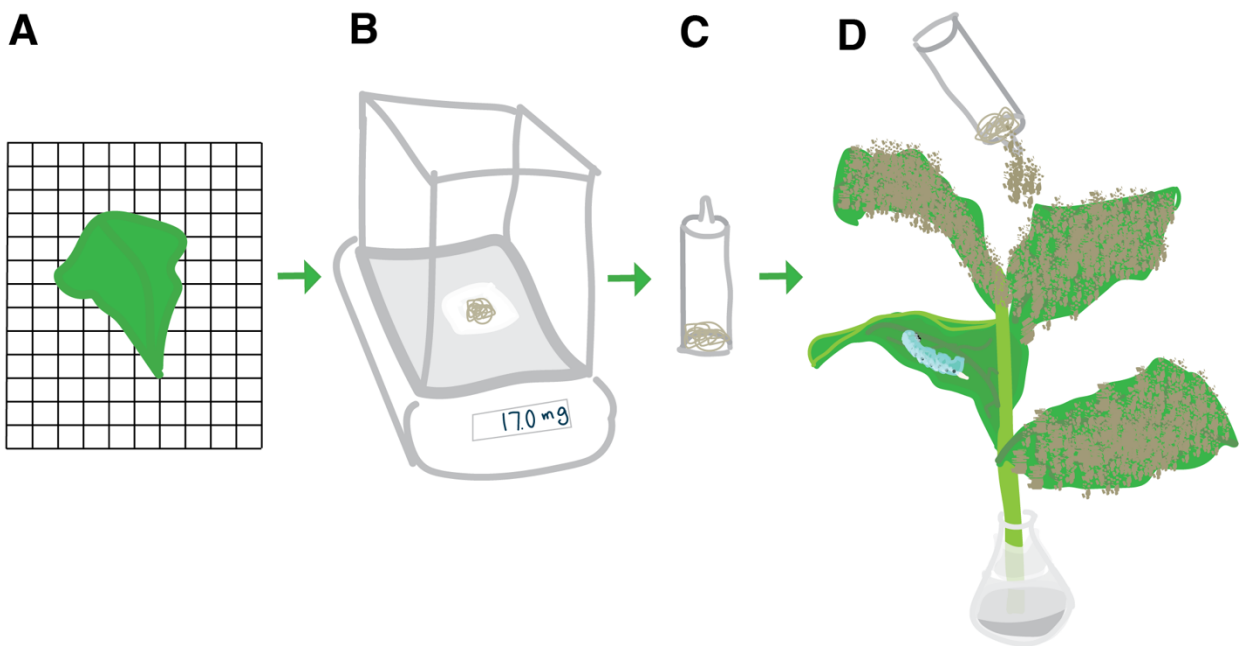
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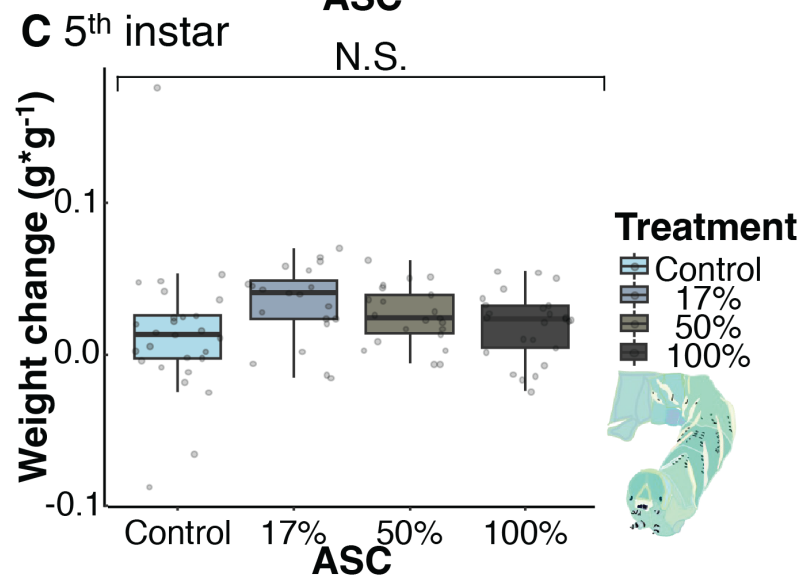
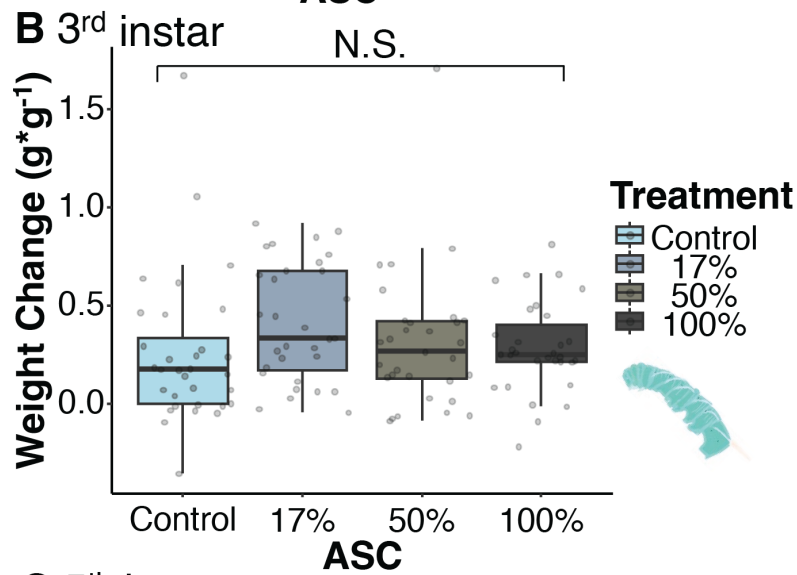
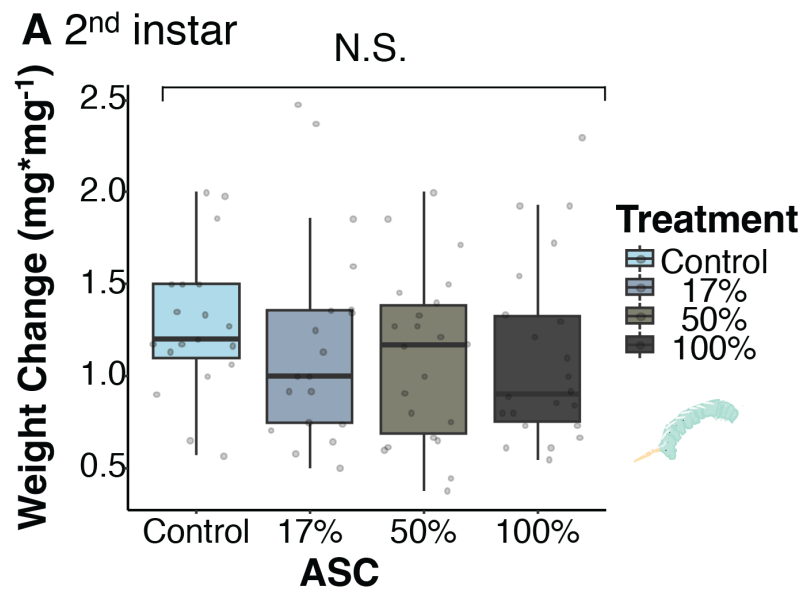
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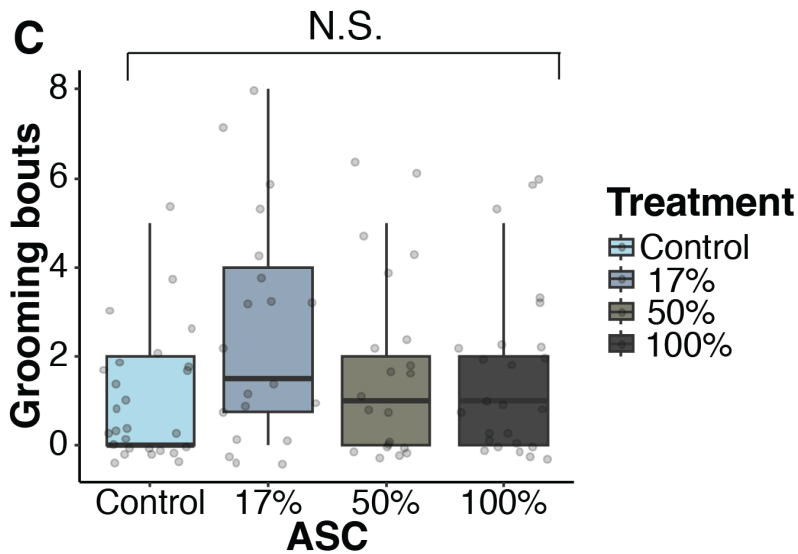
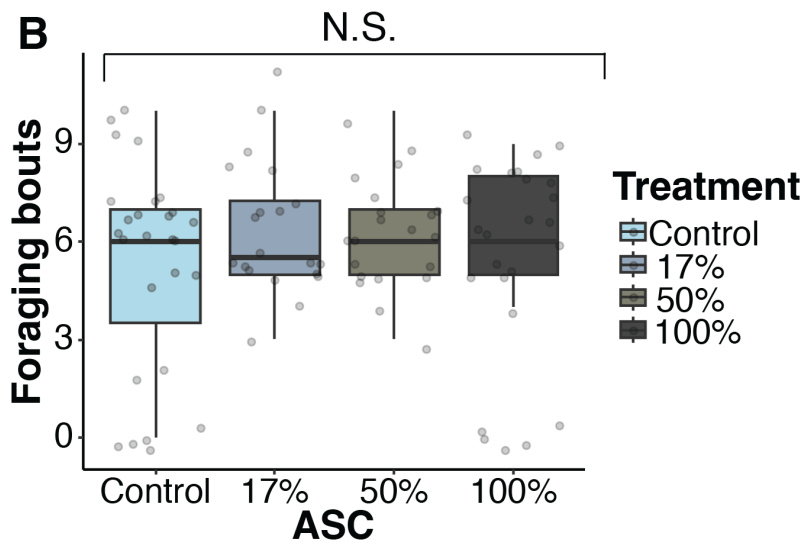
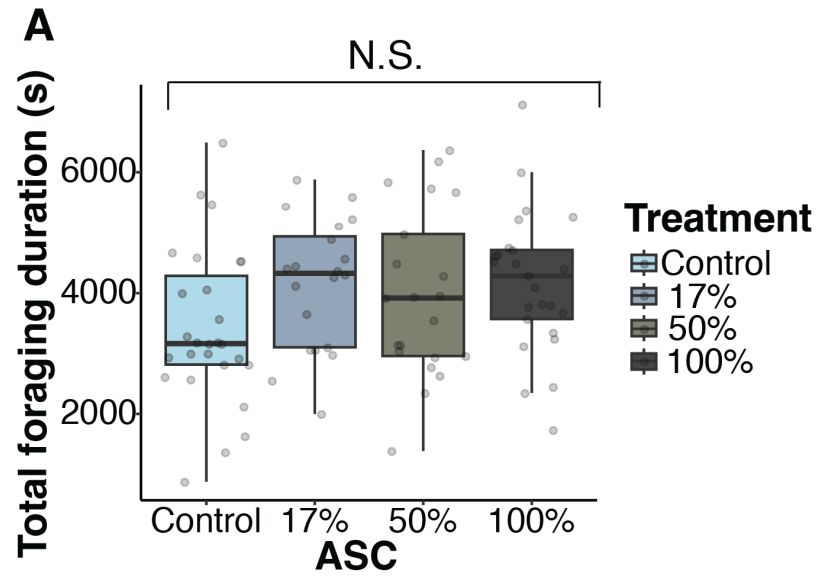
Supplementary Figures



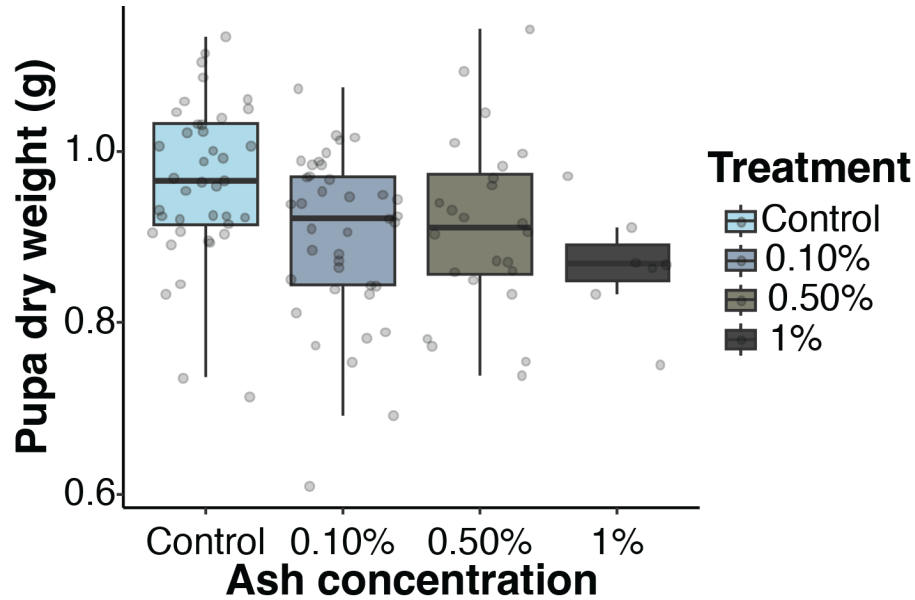
Supplementary Figure 1. Visual demonstration of leaf area measurement and ash application prior to feeding trials. Panel A represents a tobacco leaf on grid paper for leaf area measurement. Panel B represents weighing the ash in a weigh boat for the specified leaf area and ash surface coverage treatment. Panel C represents the transfer of ash from weigh boat to squeeze bottle. Panel D shows the application of ash onto the leaf surface and the initial location caterpillars were placed on the leaves.



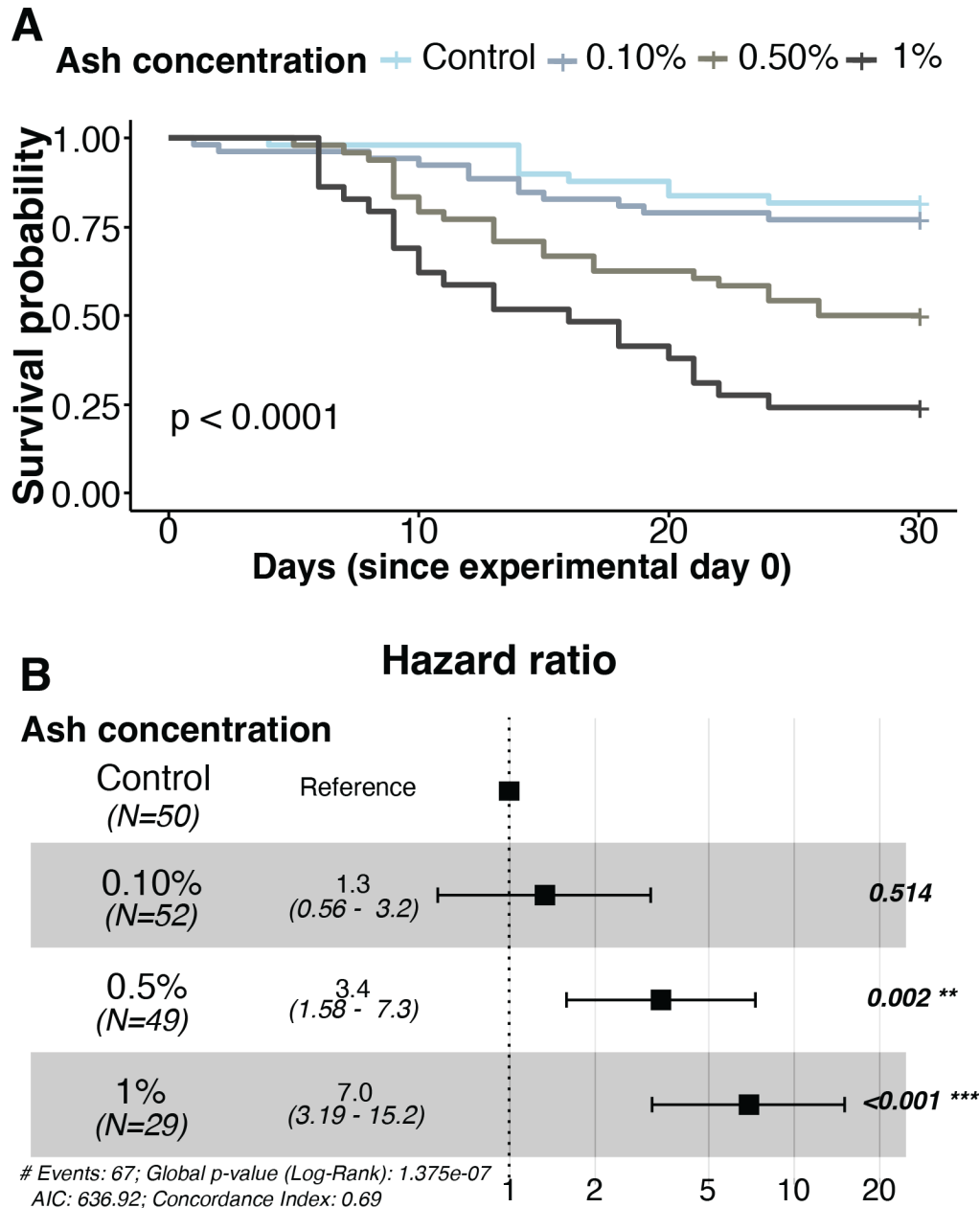
Supplementary Figure 2. Weight change after the foraging period for all instars across ash surface coverage (ASC) application (Control, light blue; 17%, blue gray; 50%, light gray; 100%, dark gray) Panel A represents feeding by 2nd instar caterpillars (N = 82). Panel B represents feeding by 3rd instar caterpillars (N = 125). Panel C represents feeding by 5th instar caterpillars (N = 93). N.S. denotes no statistically significant differences between any group.



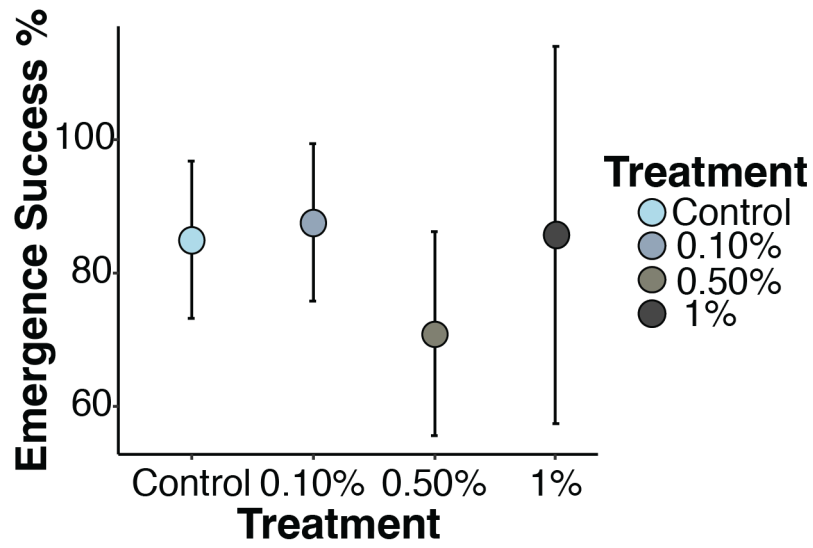
Supplementary Figure 3. Behaviors recorded of 5th instar caterpillars during foraging period for each ash surface coverage (ASC) application (Control, light blue; 17%, blue gray; 50%, light gray; 100%, dark gray). Panel A represents total foraging duration (s). Panel B represents foraging bouts. Panel C represents grooming bouts. N.S. denotes statistical insignificance.



Supplementary Figure 4. Dry pupal weight (g) by ash concentration (Control, light blue; 0.10%, blue gray; 0.50%, light gray). N.S. denotes statistical insignificance.



Supplementary Figure 5. A) Survival curves of *Manduca sexta* prepupae by diet treatment (Control, light blue; 0.10%, blue gray; 0.50%, light gray; 1%, dark gray). B) Cox hazard ratio for mortality for *M. sexta* prepupae by diet treatment. P-values generated from Kaplan-Meier survival curve log-rank test.



Supplementary Figure 6. Proportion of pupated caterpillars that emerged by ash concentration (Control, light blue; 0.10%, blue gray; 0.50%, light gray). N.S. denotes statistical insignificance.

Supplementary Tables

Percent Leaf Area Consumed			
	Instar 2 PLAC	Instar 3 PLAC	Instar 5 sqrt(PLAC)
Control (Intercept)	1.950*** (0.297)	15.200*** (2.673)	3.335*** (0.298)
17% ASC	-0.175 (0.424)	1.812 (2.767)	0.326 (0.401)
50% ASC	-0.371 (0.418)	1.189 (3.113)	-0.110 (0.375)
100% ASC	-0.329 (0.418)	0.083 (2.914)	0.053 (0.296)
Observations	82	123	93
AIC	187.8	871.8	582.6
BIC	202.2	891.5	600.3
RMSE	0.53	6.68	0.63

Note: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.001$

Supplementary Table 1. Model outputs for percent leaf area consumed (PLAC) by 2nd, 3rd, and 5th instar caterpillars during the foraging period across each ash surface coverage (ASC) application. Percent leaf area consumed is square root transformed for 5th instar caterpillars to meet assumptions of normality. Coefficients and standard errors (reported in parentheses) are displayed for each ash surface coverage. Observations indicate sample size per instar.

Weight gain per instar			
	Instar 2 (mg*mg ⁻¹)	Instar 3 (g*g ⁻¹)	Instar 5 (g*g ⁻¹)
Control (Intercept)	1.276*** (0.147)	0.255*** (0.076)	0.016** (0.008)
17% ASC	-0.103 (0.210)	0.107 (0.086)	0.017 (0.011)
50% ASC	-0.197 (0.206)	0.038 (0.092)	0.009 (0.011)
100% ASC	-0.163 (0.206)	0.014 (0.088)	0.000 (0.010)
Observations	82	125	93
AIC	124.2	77.1	-347.1
BIC	138.7	96.9	-331.9
RMSE	0.39	0.26	0.03

Note: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.001$

Supplementary Table 2. Model outputs for weight gain normalized by initial weight during the foraging period across instars and ash surface coverage (ASC) application. Coefficients and standard errors (reported in parentheses) are displayed for each ash surface coverage. Observations indicate sample size per instar.

On-plant behaviors			
	Foraging Duration (s)	Foraging Bouts	Grooming Bouts
Control (Intercept)	3611.595*** (324.870)	5.868*** (0.755)	0.129 (0.384)
17% ASC	489.843 (461.940)	0.508 (0.780)	0.224 (0.460)
50% ASC	318.855 (438.468)	-0.108 (0.745)	0.055 (0.497)
100% ASC	412.746 (403.323)	-0.302 (0.609)	0.056 (0.345)
Observations	93	93	93
AIC	1538.8	371.4	328.5
BIC	1554.0	386.6	343.7
RMSE	1064.08	1.31	1.45

Note: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.001$

Supplementary Table 3. Model outputs for 5th instar foraging and grooming behaviors leaf area consumed by 2nd, 3rd, and 5th instar caterpillars for each ash surface coverage (ASC) application during the foraging period. Percent leaf area consumed is square root transformed for 5th instar caterpillars to meet assumptions of normality. Coefficients and standard errors (reported in parentheses) are displayed for each ash surface coverage. Observations indicate sample size per instar.