

Supplement

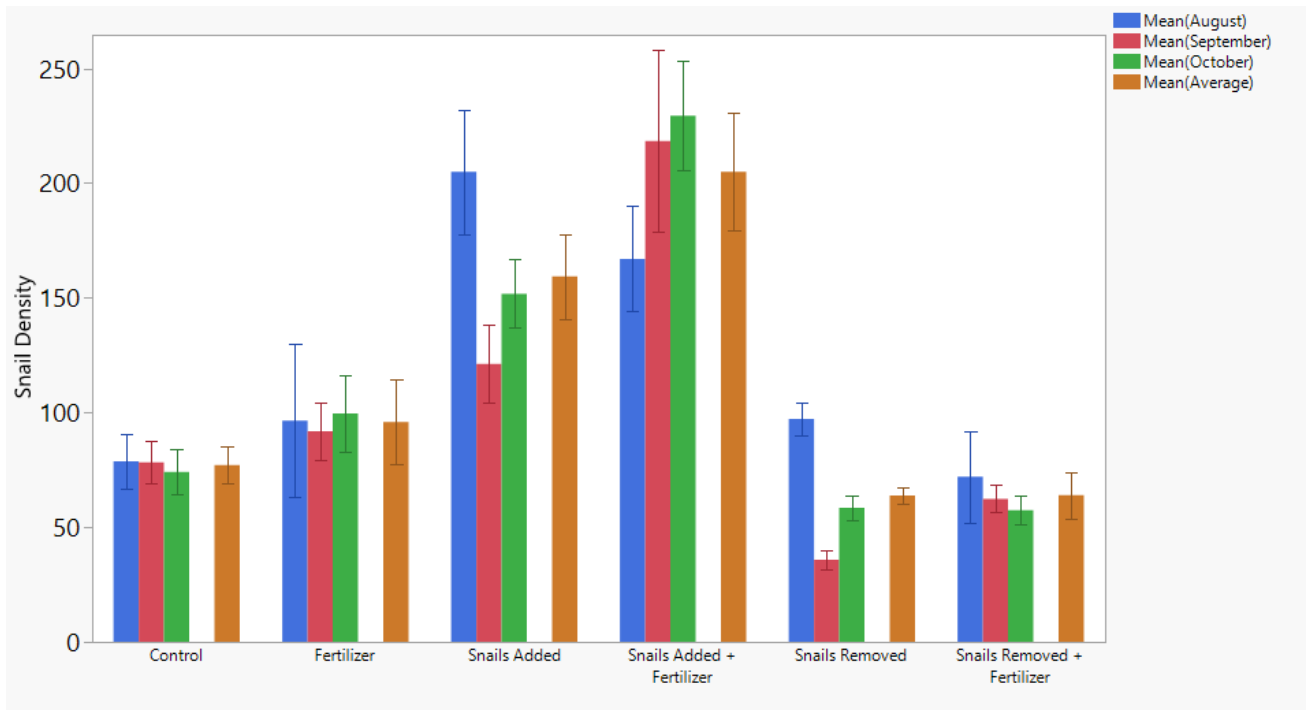


Figure S1. Densities of *Melampus bidentatus* throughout treatment plots in August, September, and October as well as the average.

Table S1. Results from linear mixed models examining the differences in fungal ASV richness, Pielou’s evenness, and Shannon’s diversity between timepoints, treatments, and fertilized/unfertilized plots, respectively.

Response Variable	Predictor	DF Num	DF Den	F Ratio	P Value	Post hoc
Fungi ASV Richness	Time	1	48	7.54	0.0086	Sept > Nov
	Fertilizer	1	48	0.02	0.96	
	Snails	2	48	0.72	0.49	
	Fertilizer:Snails	2	48	1.44	0.25	
Pielou’s Evenness	Time	1	48	0.41	0.53	Unfert.Sept > Fert.Sept
	Fertilizer	1	48	9.84	0.003	
	Snails	2	48	0.83	0.83	
	Fertilizer:Snails	2	48	1.93	1.93	
Shannon’s Diversity	Time	1	48	12.83	<0.001	Sept > Nov Unfert>Fert
	Fertilizer	1	48	6.02	0.018	
	Snails	2	48	0.36	0.70	
	Fertilizer:Snails	2	48	2.34	0.11	

Table S2. Results from linear mixed models examining the differences in algal ASV richness, Pielou’s evenness, and Shannon’s diversity between timepoints, snail treatments, and fertilizer treatments, respectively.

Response Variable	Predictor	DF Num	DF Den	F Ratio	P Value	Post hoc
Algae						
ASV Richness	Time	1	48	4.92	0.032	Sept > Nov
	Fertilizer	1	48	1.42	0.24	
	Snails	2	48	0.54	0.59	
	Fertilizer:Snails	2	48	1.64	0.21	
Pielou’s Evenness	Time	1	48	43.37	<0.001	Sept > Nov
	Fertilizer	1	48	0.18	0.90	
	Snails	2	48	0.41	0.41	
	Fertilizer:Snails	2	48	0.72	0.5	
Shannon’s Diversity	Time	1	48	53.7	<0.001	Sept > Nov
	Fertilizer	1	48	0.94	0.33	
	Snails	2	48	0.89	0.42	
	Fertilizer:Snails	2	48	0.93	0.38	

Table S3. Ranked models from linear mixed model selection on fungal alpha diversity metrics. Bold rows depict best-fit models outcompeted null models containing only random variables. Asterisks: *** = $p < 0.001$, ** = $p < 0.01$, * = $p < 0.05$.

Response Variable	Model Rank	AIC	χ^2	Predictor variables and standardized β estimates (\pm se) of best-fit model
<i>Litter Bundle 1</i>				
Fungal Richness	1	284.6	5.9*	Amphipods** (-0.53 \pm 0.15)
	Null	291.4		<i>Null Model</i>
Fungal Evenness	1	-74.8	23.1***	Snails* (0.46 \pm 0.18) + Isopods** (0.51 \pm 0.18) + Live Biomass*** (-1.23 \pm 0.23)
	2	-73.7	-	Live Biomass + Isopods
	3	-73.6	-	Live Biomass
	Null	-63.9	-	<i>Null Model</i>
Fungal Diversity	1	29.4	18.5***	Live Biomass*** (-1.19 \pm 0.24)
	2	29.8	-	Live Biomass + Amphipods
	3	30.7	-	Live Biomass + Snails
	Null	41.9	-	<i>Null Model</i>
<i>Litter Bundle 2</i>				
Fungal Richness	Null	113.7	-	<i>Null Model</i>
	1	116	-	Salinity
Fungal Evenness	1	31.9	6.7*	Sediment NH₄⁺* (0.51 \pm 0.18) + Litter %N* (0.55 \pm 0.25) + Sediment pH (0.39 \pm 0.22)
	2	-32.5	-	Sediment NH ₄ ⁺ + Litter %N
	Null	36.7	-	<i>Null Model</i>
Fungal Diversity	Null	17.6	-	<i>Null model</i>
	1	20.5	-	Humidity

Table S4. Ranked models from linear mixed model selection on algal alpha diversity metrics. Bold rows depict best-fit models outcompeted null models containing only random variables. Asterisks: *** = $p < 0.001$, ** = $p < 0.01$, * = $p < 0.05$.

Response Variable	Model Rank	AIC	χ^2	Predictor variables and standardized β estimates (\pm se) of best-fit model
<i>Litter Bundle 1</i>				
Algal Richness	1	93.7	6.1*	Amphipods* (-0.44 \pm 0.16)
	2	94.9	-	Amphipods – Litter %N
	Null	97.9	-	<i>Null Model</i>
Algal Evenness	1	91.4	4.6*	Litter %N* (0.33 \pm 0.16)
	2	92.5	-	Litter %N + Live Biomass
	3	92.9	-	Live Biomass
	Null	95	-	<i>Null Model</i>
Algal Diversity	1	89.3	6.9**	Amphipods* (-0.44 \pm 0.16)
	Null	94.2	-	<i>Null Model</i>
<i>Litter Bundle 2</i>				
Algal Richness	1	61	4.3*	Salinity* (0.36 \pm 0.18)
	2	62.2	-	Salinity - Live Biomass
	Null	63.3	-	<i>Null Model</i>
Algal Evenness	Null	65.9	-	<i>Null Model</i>
Algal Diversity	1	64.22	-	Sediment pH
	Null	67	-	<i>Null Model</i>
	1	66.4	-	Salinity

Table S5. Results from PERMANOVA analysis contrasting unweighted UniFrac distances of fungal and algal communities between timepoints, treatments, and fertilized/unfertilized plots, respectively.

Response Variable	Predictor	Df	Total Df	F Value	R²	P Value
<i>Collection Period</i>						
Unweighted Unifrac (Fungi)	Time	1	53	2.34	0.043	0.02
Unweighted Unifrac (Algae)	Time	1	53	6.43	0.1	<0.001
<i>Litter Bundle 1</i>						
Unweighted Unifrac (Fungi)	Fertilizer	1	32	2.35	0.061	0.025
	Snails	2	32	0.59	0.034	0.92
	Fertilizer:Snails	2	32	1.36	0.013	0.44
Unweighted Unifrac (Algae)	Fertilizer	1	32	0.8	0.27	0.53
	Snails	2	32	0.24	0.016	0.99
	Fertilizer:Snails	2	32	0.44	0.029	0.90
<i>Litter Bundle 2</i>						
Unweighted Unifrac (Fungi)	Fertilizer	1	20	1.31	0.07	0.25
	Snails	2	20	0.90	0.084	0.58
	Fertilizer:Snails	2	20	0.66	0.069	0.89
Unweighted Unifrac (Algae)	Fertilizer	1	20	2.08	0.08	0.058
	Snails	2	20	0.88	0.068	0.55
	Fertilizer:Snails	2	20	1.27	0.097	0.28

Table S6. Results from PERMANOVA analysis contrasting Bray-Curtis distances of fungal and algal communities between timepoints, treatments, and fertilized/unfertilized plots, respectively.

Response Variable	Predictor	Df	Total Df	F Value	R²	P Value
<i>Collection Period</i>						
Bray-Curtis (Fungi)	Time	1	54	2.9	0.051	0.011
Bray-Curtis (Algae)	Time	1	54	16.4	0.24	<0.001
<i>Litter Bundle 1</i>						
Bray-Curtis (Fungi)	Fertilizer	1	32	4.10	0.12	0.003
	Snails	2	32	0.65	0.039	0.81
	Fertilizer:Snails	2	32	0.71	0.042	0.76
Bray-Curtis (Algae)	Fertilizer	1	32	0.74	0.024	0.54
	Snails	2	32	0.50	0.033	0.86
	Fertilizer:Snails	2	32	0.62	0.04	0.76
<i>Litter Bundle 2</i>						
Bray-Curtis (Fungi)	Fertilizer	1	32	2.90	0.13	0.004
	Snails	2	32	0.89	0.079	0.58
	Fertilizer:Snails	2	32	1.03	0.090	0.41
Bray-Curtis (Algae)	Fertilizer	1	32	1.04	0.043	0.34
	Snails	2	32	0.89	0.069	0.44
	Fertilizer:Snails	2	32	1.34	0.08	0.24

Table S7. Results from SIMPER analysis contrasting Bray-Curtis distances of fungal communities between timepoints, treatments, and fertilized/unfertilized plots, respectively.

Contrast	Order and/or Finest Taxonomy	Cont. %	Cum. %	Avg. % Abundances	
				1	2
Timepoints 1 & 2	Microascales: <i>Natantispora retorquens</i>	30.0	40.1	44.8	34.7
	Unassigned Ascomycota	12.9	58.7	12.7	22.1
	Pleosporales: <i>Phaesphaeria halima</i>	7.8	69.7	13.2	8.0
	Unassigned Fungi	6.0	78.1	7.0	10.8
	Capnodiales: Neodevriesiaceae	3.6	83.1	6.7	1.9
	Lulworthiales: <i>Lulworthia spp</i>	3.1	87.5	3.5	6.0
	Unassigned Pleosporales	2.0	92.4	3.9	5.7
	Eurotiales: <i>Talaromyces helicus</i>	1.6	96.2	2.7	2.9
	Pleosporales: Phaeosphaeriaceae	1.6	97.0	2.7	3.2
	Microscales: <i>Lignincola laevis</i>	1.1	97.4	1.5	1.9
	Unfert/Fert (Bundle 1)				Unfert
Microascales: <i>Natantispora retorquens</i>		34.2	50.3	32.5	56.3
Unassigned Ascomycota		8.3	62.4	23.0	3.0
Pleosporales: <i>Phaesphaeria halima</i>		8.1	74.4	14.7	11.6
Capnodiales: Neodevriesiaceae		4.1	80.4	4.6	8.6
Unassigned Fungi		3.9	86.2	9.2	4.9
Lulworthiales: <i>Lulworthia spp</i>		1.9	89.0	5.5	1.7
Unassigned Pleosporales		1.9	91.8	4.0	3.8
Pleosporales: Phaeosphaeriaceae		1.7	94.3	1.9	3.4
Microscales: <i>Lignincola laevis</i>		1.0	95.8	1.1	1.9
Unfert/Fert (Bundle 2)					Unfert
	Unassigned Ascomycota	23.3	30.3	38.8	8.1
	Microascales: <i>Natantispora retorquens</i>	22.5	60	13.0	52.8
	Unassigned Fungi	8.7	70.8	13.6	8.4
	Pleosporales: <i>Phaesphaeria halima</i>	5.6	78.1	11.2	5.3
	Eurotiales: <i>Talaromyces helicus</i>	4.4	83.4	6.5	~0
	Lulworthiales: <i>Lulworthia spp</i>	4.4	89.5	4.8	7.0
	Unassigned Pleosporales	2.0	92.0	2.9	7.9
	Pleosporales: Phaeosphaeriaceae	1.3	93.7	3.0	3.4
	Microscales: <i>Lignincola laevis</i>	1.2	95.3	0.9	2.8
	Capnodiales: Neodevriesiaceae	1.2	96.9	2.0	1.8

Table S8. Results from SIMPER analysis contrasting Bray-Curtis distances of algal communities between timepoints, treatments, and fertilized/unfertilized plots, respectively.

Contrast	Order and/or Finest Taxonomy	Cont. %	Cum. %	Avg. % Abundances	
				1	2
Timepoints 1 & 2	Ulotrichales: <i>Chlorothrix</i> spp.	29.8	40.3	0.7	50.5
	Ulvales: <i>Pseudendoclonium submarinum</i>	26.9	76.7	75.9	27.4
	Unassigned Ulvales	6.2	86.0	12.9	9.1
	Ulotrichales: <i>Acrosiphonia arcta</i>	4.2	90.7	~0.0	7.0
	Unassigned Chlorophyta	2.8	92.9	5.8	2.3
	Unassigned Ulotrichales	1.5	95.0	0.2	2.6
	Unassigned Chlorophyceae	1.0	96.8	1.6	0.5
	Ulvales: <i>Ulva compressa</i>	1.0	98.1	2.6	0.4
Unfert/Fert (Bundle 1)				Unfert	Fert
	Ulvales: <i>Pseudendoclonium submarinum</i>	38.7	72.0	73.7	77.7
	Unassigned Ulvales	6.8	84.7	15.1	10.8
	Unassigned Chlorophyta	3.8	92.1	6.8	4.9
	Ulvales: <i>Ulva compressa</i>	1.7	95.1	2.4	2.3
	Unassigned Chlorophyceae	1.6	98.0	0.6	2.6
Unfert/Fert (Bundle 2)				Unfert	Fert
	Ulotrichales: <i>Chlorothrix</i> spp.	27.7	49.3	53.7	47.7
	Ulvales: <i>Pseudendoclonium submarinum</i>	11.5	69.9	21.4	32.4
	Unassigned Ulvales	6.8	82.0	12.7	6.0
	Ulotrichales: <i>Acrosiphonia arcta</i>	5.0	90.9	6.3	7.5
	Unassigned Ulotrichales	1.7	94.0	1.8	3.2
	Unassigned Chlorophyta	1.6	95.0	2.6	4.1