Supplemental Table 2. ANOVA of alpha-diversity metrics (Shannon's diversity and richness) and beta-dispersion across the full dataset with Tukey's post-hoc tests. ANOVA analyses for Shannon's diversity, richness, and beta-dispersion across full dataset for significance of the factors Category (Soil Control, Simple Substrates, Antibiotics, Polysaccharides, Anaerobic, or Stress Modules) and Replicate, and by individual ModuleName (the specific module) and Replicate. These factors have to be run in separate ANOVA analyses due to the interdependence of factors Category and ModuleName; furthermore, separate analyses were run for the full dataset where soils were either included or excluded (as indicated below) to examine the influence of the control soils on alpha-diversity metrics. (Control soils refer to liquid soil extract controls and not native soils). ANOVA calculations used the 'aov' function in the 'stats ' package in R. The 'betadisper' function within the 'vegan' package was used for calculation of beta-dispersion values. Tukey's for alpha-diversity and beta-dispersion on full dataset by Category and ModuleName. Tukey's results for Shannon's Diversity / richness / beta-dispersion were done for the full dataset (or full dataset excluding soil controls) by Category or by ModuleName. Generation of Tukey's values was accomplished using the 'HSD.test' function as part of the 'agricolae' package in R. Native soils are not included in this set of analyses.

Shannon's Diversity

All Samples by Category

Factor	Degrees of Freedom	Sum of Squares	Mean Squares	F Statistic	p-value	
Category	5	36.741263	7.3482525	14.5629021	8.05E-13	***
Replicate	9	2.728213	0.3031348	0.6007582	0.7962197	
Residuals	309	155.917414	0.5045871			

All Samples except Soil Control by Category

Factor	Degrees of Freedom	Sum of Squares	Mean Squares	F Statistic	p-value	
Category	4	13.360337	3.3400843	6.5539936	4.52E-05	***
Replicate	9	3.141496	0.3490551	0.6849244	0.7225312	
Residuals	305	155.43587	0.5096258			

All Samples by ModuleName

Factor	Degrees of Freedom	Sum of Squares	Mean Squares	F Statistic	p-value	
ModuleName	65	90.150909	1.3869371	3.3403675	5.93E-12	***
Replicate	9	1.849954	0.2055504	0.4950577	0.8772459	
Residuals	249	103.386027	0.4152049			

All Samples except Soil Control by ModuleName

Factor	Degrees of Freedom	Sum of Squares	Mean Squares	F Statistic	p-value	
ModuleName	64	66.769983	1.043281	2.4815282	3.16E-07	***
Replicate	9	2.165126	0.2405696	0.5722143	0.8193376	
Residuals	245	103.002594	0.4204187			

Richness

All Samples by Category

Factor	Degrees of Freedom	Sum of Squares	Mean Squares	F Statistic	p-value	
Category	5	433984.43	86796.885	9.3179206	2.79E-08	***
Replicate	9	33587.76	3731.973	0.4006391	0.9343001	
Residuals	309	2878350.07	9315.049			

All Samples except Soil Control by Category

Factor	Degrees of Freedom	Sum of Squares	Mean Squares	F Statistic	p-value
Category	4	62448.01	15612.003	1.6678057	0.157332
Replicate	9	39573.68	4397.076	0.4697327	0.8944491
Residuals	305	2855045.35	9360.804		

All Samples by ModuleName

Factor	Degrees of Freedom	Sum of Squares	Mean Squares	F Statistic	p-value	
ModuleName	65	1079082.31	16601.266	1.8523852	4.16E-04	***
Replicate	9	35276.36	3919.596	0.4373522	0.914025	
Residuals	249	2231563.59	8962.103			

All Samples except Soil Control by ModuleName

Factor	Degrees of Freedom	Sum of Squares	Mean Squares	F Statistic	p-value
ModuleName	64	707545.89	11055.405	1.2268836	0.1385138
Replicate	9	41834.91	4648.323	0.5158519	0.8625127
Residuals	245	2207686.24	9010.964		

Faith's PD

All Samples by Category

Factor	Degrees of Freedom	Sum of Squares	Mean Squares	F Statistic	p-value	
Category	5	10451.602	2090.32033	13.5317626	6.03E-12	***
Replicate	9	527.146	58.57178	0.3791665	0.94468	
Residuals	309	47732.805	154.4751			

All Samples except Soil Control by Category

Factor	Degrees of Freedom	Sum of Squares	Mean Squares	F Statistic	p-value	
Category	4	1414.4809	353.62022	2.2839098	0.06033214	.
Replicate	9	635.3561	70.59512	0.4559493	0.90314783	
Residuals	305	47223.4788	154.83108			

All Samples by ModuleName

Factor	Degrees of Freedom	Sum of Squares	Mean Squares	F Statistic	p-value	
ModuleName	65	23318.5118	358.74634	2.5677581	8.94E-08	***
Replicate	9	604.7805	67.19783	0.4809743	0.8867868	
Residuals	249	34788.26	139.71189			

All Samples except Soil Control by ModuleName

Factor	Degrees of Freedom	Sum of Squares	Mean Squares	F Statistic	p-value	
ModuleName	64	14281.391	223.14674	1.5948691	0.00640389	**
Replicate	9	712.6536	79.18374	0.5659401	0.82436043	
Residuals	245	34279.2711	139.91539			

Beta-Dispersion - Weighted UniFrac

All Samples by Category

Factor	Degrees of Freedom	Sum of Squares	Mean Squares	F Statistic	p-value	
Category	5	0.159254	0.031850802	7.174466	2.27E-06	***
Replicate	9	0.1407213	0.0156357	3.521977	3.59E-04	***
Residuals	309	1.3717952	0.004439467			

All Samples by ModuleName

Factor	Degrees of Freedom	Sum of Squares	Mean Squares	F Statistic	p-value	
ModuleName	65	0.7887929	0.012135275	3.754123	3.57E-14	***
Replicate	9	0.07808038	0.008675598	2.683851	5.41E-03	**
Residuals	249	0.80489724	0.003232519			

Beta-Dispersion - Unweighted UniFrac

All Samples by Category

Factor	Degrees of Freedom	Sum of Squares	Mean Squares	F Statistic	p-value	
Category	5	0.1411654	0.028233089	3.003752	0.01155219	*
Replicate	9	0.1225558	0.013617308	1.448762	0.16649062	
Residuals	309	2.9043757	0.009399274			

All Samples by ModuleName

Factor	Degrees of Freedom	Sum of Squares	Mean Squares	F Statistic	p-value	
ModuleName	65	1.2302634	0.01892713	2.565021	9.25E-08	***
Replicate	9	0.1004781	0.011164238	1.512987	0.144	
Residuals	249	1.8373554	0.007378937			

Shannon's Diversity (Tukey's post-hoc tests)

All Samples by Category

Category	value	groups
SoilExtract	3.539821	a
Polysaccharides	1.855916	b
Stresses	1.405652	c
Anaerobic	1.291957	c
Antibiotics	1.198551	c
Simple Substrates	1.15434	c

All Samples except Soil Control by Category

Category	value	groups
Polysaccharides	1.855916	a
Stresses	1.405652	b
Anaerobic	1.291957	b
Antibiotics	1.198551	b
Simple Substrates	1.15434	b

All Samples by ModuleName

ModuleName	value	groups
soil_control	3.5398212	a
10%C_xylose	2.55783	ab
chitin	2.3178727	abc
late_xylan	2.2943745	abc
cellulose	2.141698	abcd
xylose	2.0680091	abcd
salt_xylan	2.0258973	abcd
cellobiose	1.9344026	abcd
xylan	1.8982978	abcde
heat_xylan	1.8785432	abcde
fsFeSO4	1.7309074	bcde
pH8_xylan	1.7240041	bcde
10%C_n-acetylglucos	1.7209537	bcde
late_xylose	1.6800718	bcde
trehalose	1.6696724	bcde
gentamycin	1.6696096	bcde
pH6_n-acetylglucosar	1.6102333	bcde
pectin	1.6062958	bcde
heat_xylose	1.606175	bcde
10%C_xylan	1.5938325	bcde
nonfsFeSO4	1.5031332	bcde
pH6_glucose	1.4985512	bcde
rhamnose	1.4883464	bcde
light_xylan	1.4780847	bcde
light_xylose	1.4741586	bcde
heat_n-acetylglucosa	1.4700513	bcde
PEG_xylose	1.4677898	bcde
malate	1.4480653	bcde
mannose	1.4437478	bcde
acetogen	1.4433919	bcde
glucose	1.4368425	bcde
salt_xylose	1.4256398	bcde
sucrose	1.4231749	bcde
pH8_n-acetylglucosar	1.3989831	bcde
late_n-acetylglucosar	1.3896492	bcde
pH8_xylose	1.3785238	bcde
D-galacturonicacid	1.3298843	bcde
arabinose	1.3242232	bcde
ironcitrate	1.2986258	bcde
2,4-D_xylan	1.2918247	bcde
salt_n-acetylglucosar	1.1995701	bcde
erythromycin	1.1910448	bcde
light_n-acetylglucosa	1.1794589	bcde
benomyl	1.1746653	bcde
citrate	1.1590295	bcde
nystatin	1.1180087	bcde
streptomycin	1.105284	bcde
glucosamine	1.1051839	bcde
2,4-D_n-acetylglucos	1.0983121	bcde
acetate	1.0914352	bcde
D-glucuronicacid	1.0624586	bcde
glycerol	1.0044042	bcde
pyruvate	0.9864825	bcde
pH8_glucose	0.9780552	bcde
PEG_xylan	0.9599766	bcde
galactose	0.9428435	bcde
chloramphenicol	0.9326966	bcde
glutamate	0.9139306	bcde
2,4-D_xylose	0.8385404	cde
2,4-D_2,4-D	0.7733707	cde
n-acetylglucosamine	0.6415306	cde
propionate	0.5319863	cde
PEG_n-acetylglucosar	0.523904	de
glycine	0.5010706	de
potassiumnitrate	0.4837291	de
salt_glucose	0.2475454	e

Richness (Tukey's post-hoc tests)

All Samples by Category

Category	value	groups
SoilExtract	330.8	a
Stresses	69.73103	b
Polysaccharides	60.02857	b
Anaerobic	46.64	b
Antibiotics	45.8	b
Simple Substrates	37.34524	b

All Samples except Soil Control by Category

Category	value	groups
Stresses	69.73103	a
Polysaccharides	60.02857	a
Anaerobic	46.64	a
Antibiotics	45.8	a
Simple Substrates	37.34524	a

All Samples by ModuleName

ModuleName	value	groups
soil_control	330.8	a
salt_xylose	280.4	ab
salt_xylan	275.2	abc
2,4-D_xylan	204.4	abcd
10%C_xylose	92.6	abcd
chitin	87	abcd
late_xylan	83.8	abcd
streptomycin	75.6	bcd
cellulose	73.6	bcd
10%C_xylan	66.8	bcd
pH8_xylan	66.8	bcd
late_xylose	65.8	bcd
10%C_n-acetylglu	62.4	bcd
trehalose	60.8	bcd
xylose	60.2	bcd
xylan	59	bcd
fsFeSO4	57.4	bcd
gentamycin	56	bcd
pH8_xylose	55.6	bcd
light_xylan	55.2	bcd
light_xylose	54.2	bcd
D-galacturonicacid	53.8	bcd
cellobiose	53.4	bcd
salt_n-acetylgluco	52.6	bcd
heat_n-acetylgluco	51.8	bcd
rhamnose	51.4	bcd
nonfsFeSO4	51	bcd
pH6_n-acetylgluco	50	bcd
acetogen	49.8	bcd
mannose	47.2	bcd
heat_xylose	47	bcd
arabinose	46.4	bcd
pectin	45.4	bcd
late_n-acetylgluco	45.2	bcd
heat_xylan	43.2	bcd
ironcitrate	42.8	bcd
light_n-acetylgluco	42.6	bcd
PEG_xylose	41	bcd
sucrose	41	bcd
benomyl	39.6	bcd
pH6_glucose	39.6	bcd
D-glucuronicacid	38.6	bcd
acetate	38	bcd
pH8_n-acetylgluco	37.4	bcd
nystatin	37	bcd
erythromycin	35.8	bcd
glucose	35.8	bcd
galactose	35.5	bcd
malate	33.75	bcd
2,4-D_n-acetylglu	33.6	bcd
PEG_xylan	33.6	bcd
glucosamine	32.4	cd
potassiumnitrate	32.2	cd
citrate	31.8	cd
pH8_glucose	31	cd
2,4-D_xylose	30.8	cd
chloramphenicol	30.8	cd
pyruvate	29.2	cd
propionate	28	cd
glutamate	27.6	d
PEG_n-acetylgluco	27.6	d
glycerol	27	d
2,4-D_2,4-D	26.8	d
salt_glucose	25.2	d
n-acetylglucosami	23.8	d
glycine	21.5	d

Faith's PD (Tukey's post-hoc tests)

All Samples by Category

Category	value	groups
SoilExtract	50.693033	a
Stresses	9.745187	b
Polysaccharides	8.710994	bc
Antibiotics	7.643629	bc
Anaerobic	6.252677	bc
Simple Substrates	4.758783	c

All Samples except Soil Control by Category

Category	value	groups
Stresses	9.745187	a
Polysaccharides	8.710994	ab
Anaerobic	7.643629	ab
Antibiotics	6.252677	ab
Simple Substrates	4.758783	b

All Samples by ModuleName

ModuleName	value	groups
soil_control	50.693033	a
salt_xylan	39.194797	ab
salt_xylose	37.245484	abc
2,4-D_xylan	27.828453	abcd
streptomycin	17.883794	bcd
chitin	13.695318	bcd
cellulose	12.980139	bcd
late_xylan	11.907575	bcd
10%C_xylose	11.500579	bcd
10%C_xylan	10.487426	bcd
gentamycin	10.216879	bcd
light_xylose	9.834703	bcd
salt_n-acetylgluco	9.446299	bcd
10%C_n-acetylglu	8.685034	bcd
pH8_xylose	8.322625	bcd
fsFeSO4	8.230706	cd
light_xylan	8.081991	cd
late_n-acetylgluco	7.944574	cd
xylan	7.911596	cd
late_xylose	7.791858	cd
pH8_xylan	7.77859	cd
D-galacturonicacid	7.673146	cd
pectin	7.664646	cd
heat_xylan	7.161245	cd
trehalose	6.986579	cd
heat_xylose	6.68275	cd
sucrose	6.597601	cd
salt_glucose	6.573503	cd
heat_n-acetylgluc	6.550164	cd
pH6_n-acetylgluco	6.485972	cd
rhamnose	6.11503	d
D-glucuronicacid	6.005133	d
ironcitrate	5.899179	d
acetogen	5.86664	d
nonfsFeSO4	5.745044	d
benomyl	5.691592	d
light_n-acetylgluc	5.657655	d
potassiumnitrate	5.521817	d
acetate	5.508319	d
galactose	5.484528	d
glycine	5.385893	d
pH8_n-acetylgluco	5.321769	d
xylose	5.319765	d
cellobiose	5.141082	d
pyruvate	4.927374	d
arabinose	4.879559	d
2,4-D_n-acetylglu	4.873736	d
mannose	4.517	d
citrate	4.507972	d
propionate	4.421253	d
2,4-D_xylose	4.323427	d
glucose	4.303019	d
chloramphenicol	4.173645	d
PEG_xylan	4.103975	d
nystatin	4.019583	d
PEG_n-acetylgluco	3.979283	d
2,4-D_2,4-D	3.974537	d
pH6_glucose	3.951871	d
erythromycin	3.876281	d
PEG_xylose	3.770083	d
malate	3.763626	d
glucosamine	3.235574	d
glycerol	3.170885	d
pH8_glucose	3.150462	d
glutamate	3.017962	d
n-acetylglucosami	2.790932	d

Beta-Dispersion - Weighted UniFrac (Tukey's post-hoc tests)

All Samples by Category

Category	value	groups
Anaerobic	0.08908283	a
Polysaccharides	0.08120761	a
SoilExtract	0.07123272	ab
Stresses	0.06432272	ab
Antibiotics	0.04699746	ab
Simple Substrates	0.02218323	b

All Samples by ModuleName

ModuleName	value	groups
10%C_xylan	0.191033205	a
pectin	0.158058295	ab
xylan	0.155639327	abc
acetogen	0.147132591	abc
salt_xylan	0.145399226	abc
salt_xylose	0.143630581	abc
gentamycin	0.132765947	abc
nonfsFeSO4	0.121146631	abc
streptomycin	0.120640106	abc
salt_n-acetylglucos	0.117727929	abc
light_xylose	0.116277571	abc
late_xylan	0.11615672	abc
pH8_xylan	0.095725837	abc
late_n-acetylglucos	0.092090331	abc
fsFeSO4	0.090898054	abc
xylose	0.086558933	abc
pH8_n-acetylglucos	0.083804198	abc
late_xylose	0.082743357	abc
light_xylan	0.081804553	abc
10%C_xylose	0.0805482	abc
10%C_n-acetylgluc	0.078355272	abc
cellulose	0.072162582	abc
soil_control	0.071232716	abc
glucosamine	0.070689469	abc
heat_xylan	0.069811351	abc
chitin	0.069381006	abc
ironcitrate	0.060723389	abc
heat_xylose	0.059615044	abc
2,4-D_xylan	0.058577198	abc
pH8_xylose	0.057037678	abc
n-acetylglucosamin	0.049250765	abc
trehalose	0.047510508	abc
arabinose	0.04443447	abc
sucrose	0.037625545	abc
heat_n-acetylgluco	0.037040559	abc
D-glucuronicacid	0.031774058	bc
PEG_n-acetylglucos	0.030161673	bc
pH6_n-acetylglucos	0.028719652	bc
cellobiose	0.028076025	bc
potassiumnitrate	0.02551349	bc
rhamnose	0.017363059	bc
light_n-acetylgluco	0.016717796	bc
pH6_glucose	0.014446932	bc
pH8_glucose	0.014169241	bc
D-galacturonicacid	0.012907953	bc
PEG_xylose	0.01250938	bc
mannose	0.011800277	bc
PEG_xylan	0.011414597	bc
nystatin	0.010882967	bc
salt_glucose	0.010136707	bc
2,4-D_n-acetylgluc	0.009695457	bc
glucose	0.008085714	bc
chloramphenicol	0.007721128	bc
pyruvate	0.007638802	bc
glycerol	0.007463335	bc
2,4-D_xylose	0.007191175	bc
citrate	0.006801702	bc
erythromycin	0.00649927	bc
propionate	0.006086111	bc
galactose	0.005183252	bc
acetate	0.00469663	bc
malate	0.004182237	bc
benomyl	0.003475327	c
glycine	0.002885686	c
2,4-D_2,4-D	0.002817566	c
glutamate	0.001528558	c

Beta-Dispersion - Unweighted UniFrac (Tukey's post-hoc tests)

All Samples by Category

Category	value	groups
Anaerobic	0.39429880	a
Antibiotics	0.36707370	ab
Simple Substrates	0.34254170	ab
Polysaccharides	0.33600990	ab
SoilExtract	0.33093190	ab
Stresses	0.32251990	b

All Samples by ModuleName

ModuleName	value	groups
2,4-D_xylan	0.5121057	a
salt_xylan	0.5079299	ab
salt_xylose	0.4955536	abc
streptomycin	0.4629313	abcd
salt_n-acetylglucosamine	0.4264949	abcde
fsFeSO4	0.420003	abcde
nonfsFeSO4	0.4116928	abcde
cellulose	0.4082319	abcde
pyruvate	0.4039306	abcde
potassiumnitrate	0.4004015	abcde
salt_glucose	0.3925688	abcde
D-glucuronicacid	0.38754	abcde
ironcitrate	0.3758632	abcde
trehalose	0.367287	abcde
chloramphenicol	0.3668608	abcde
pectin	0.3655969	abcde
erythromycin	0.3652221	abcde
malate	0.3638342	abcde
acetogen	0.3635333	abcde
2,4-D_n-acetylglucosamine	0.3632508	abcde
galactose	0.3611358	abcde
D-galacturonicacid	0.3597186	abcde
n-acetylglucosamine	0.3568762	abcde
citrate	0.3560492	abcde
rhamnose	0.355294	abcde
benomyl	0.3526482	abcde
nystatin	0.3500973	abcde
glucosamine	0.349131	abcde
glucose	0.3487532	abcde
pH8_n-acetylglucosamine	0.3454876	abcde
glycerol	0.3393275	abcde
glycine	0.3379041	abcde
propionate	0.337782	abcde
heat_xylose	0.3365939	abcde
acetate	0.334612	abcde
soil_control	0.3309319	abcde
chitin	0.3307724	abcde
PEG_xylan	0.3252792	abcde
xylan	0.3236727	abcde
pH8_glucose	0.319478	abcde
pH8_xylose	0.3184173	abcde
10%C_xylan	0.3166579	abcde
late_xylose	0.3125608	abcde
mannose	0.3102534	abcde
2,4-D_xylose	0.3091171	abcde
sucrose	0.3074036	abcde
2,4-D_2,4-D	0.30717	abcde
pH8_xylan	0.3062233	abcde
heat_n-acetylglucosamine	0.3058527	abcde
gentamycin	0.3046823	abcde
10%C_n-acetylglucosamine	0.3035968	abcde
late_xylan	0.2981349	abcde
glutamate	0.2953915	abcde
xylose	0.2952819	abcde
pH6_glucose	0.2821135	bcde
arabinose	0.2777482	cde
light_xylan	0.277539	cde
light_n-acetylglucosamine	0.2657729	de
10%C_xylose	0.2654608	de
PEG_n-acetylglucosamine	0.2634772	de
pH6_n-acetylglucosamine	0.2499284	de
cellobiose	0.249105	de
PEG_xylose	0.245274	de
heat_xylan	0.2412184	de
late_n-acetylglucosamine	0.237352	de
light_xylose	0.2224682	e