Morphospecies Abundance of Above–Ground Invertebrates in Agricultural Systems under Glyphosate and Microplastics in South–Eastern Mexico

Edilberto Hernández–Gutiérrez [1], Jaime Rendón–von Osten [2], Griselda Escalona–Segura [3], Jorge Mendoza–Vega [1], Ricardo Dzul–Caamal [2], Sita Posthumus [4], Rianne Vastenhouw [4], Xiaomei Yang [4], Violette Geissen [4] and Esperanza Huerta–Lwanga [1,4,*]
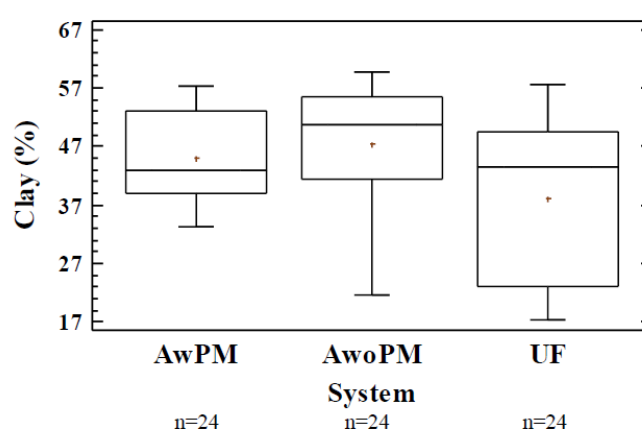
Supplementary Materials:

Figure S1. Clay percentage (%) per treatment. + = mean, middle horizontal line in the box indicates median
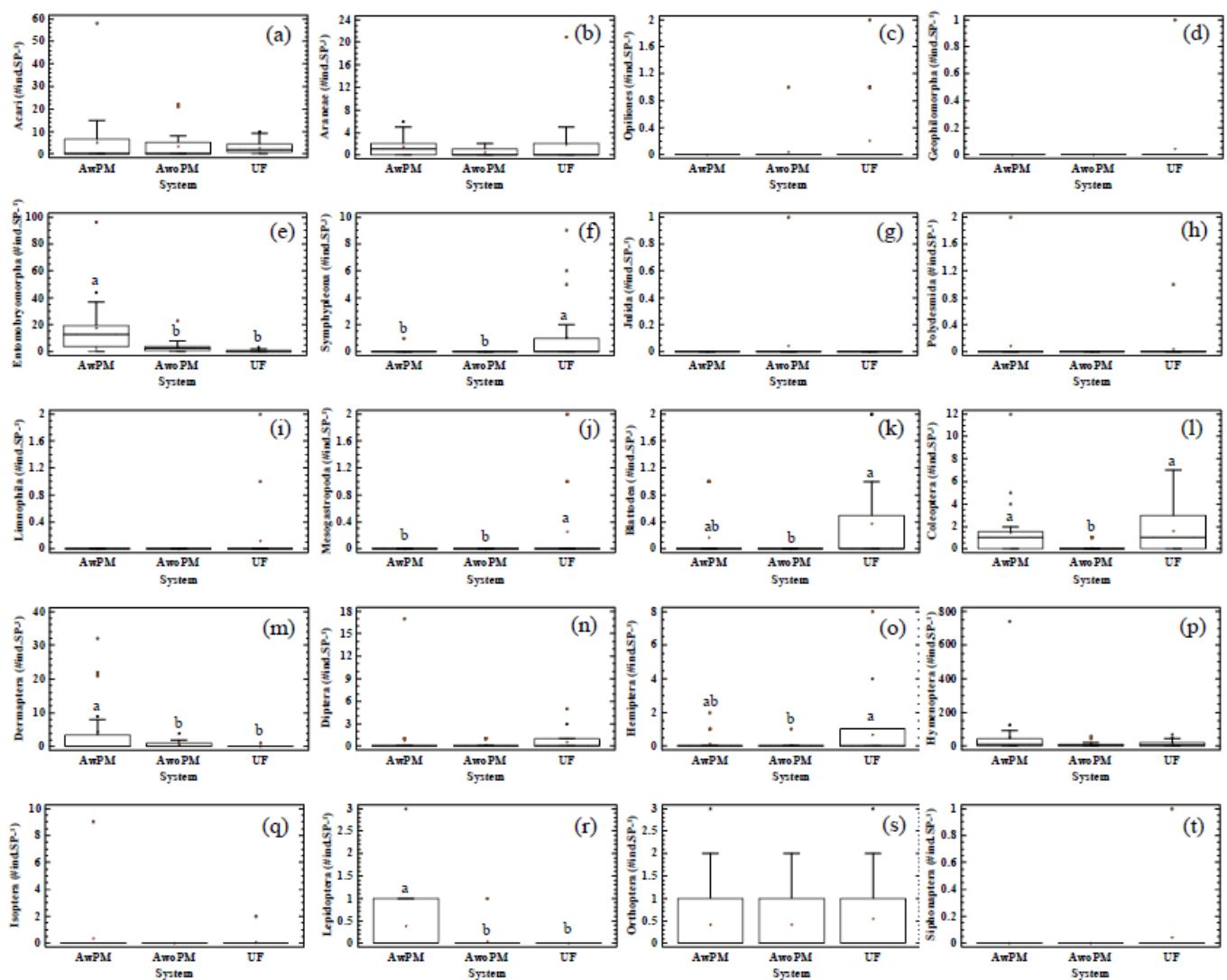
Figure S2. Number of individuals per sampling point (#ind SP⁻¹) per each order. Different letters imply significantly different groups (Mann–Whitney U test, $p < 0.05$)
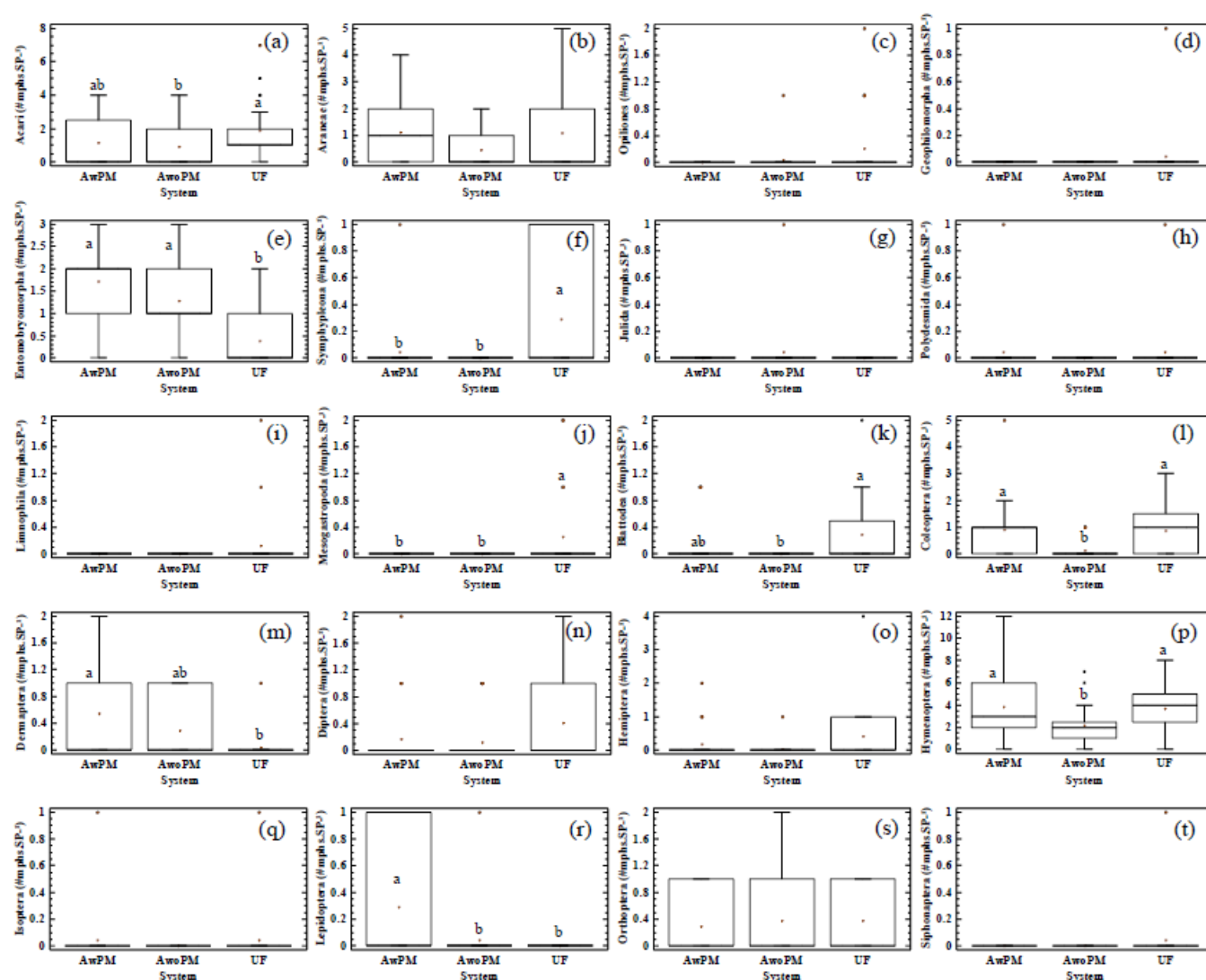
Figure S3. Number of morphospecies per sampling point (#mphs SP^{-1}) per each order. Different letters imply significantly different groups (Mann–Whitney U test, $p < 0.05$)

Table S1. Correlations between microplastics counts (MPs, *n* = 20), soil glyphosate concentration (GLYsoil, *n* = 24), soil AMPA concentration (AMPAsoil, *n* = 24) and glyphosate in invertebrate tissue (GLYinv, *n* = 72), number of individuals (#ind, *n* = 72) and morphospecies (#mphs, *n* = 72) of invertebrates and Shannon diversity index (H, *n* = 72) per sampling point. *n* = number of sampling points for statistical analysis.

	GLYsoil (mg kg soil^{-1})	AMPAsoil (mg kg soil^{-1})	GLYinv (mg kg tissue^{-1})	#ind SP^{-1}	#mphs SP^{-1}	H SP^{-1}
MPs (particles kg soil^{-1})	−0.34	−0.15	−0.01	0.37**	−0.02	−0.21
GLYslo (mg kg soil^{-1})	–	**0.85***	**−0.73***	−0.10	−0.27	−0.14
AMPAslo (mg kg soil^{-1})	–	–	**−0.59**	−0.26	−0.27	−0.03
GLYinv (mg kg tissue^{-1})	–	–	–	−0.13	**−0.25***	0.01
#ind SP^{-1}	–	–	–	–	**0.66***	−0.04
#mphs SP^{-1}	–	–	–	–	–	**0.38**

#ind = number of individuals, #mphs = number of morphospecies, H = Shannon diversity index, SP = sampling point, bold = indicates statistically significant value, *P < 0.05, **P < 0.01, ***P < 0.001.

Table S2. Number of morphospecies at each classification level.

Phylum	Subphylum	Class	Subclass	Order	Suborder	Superfamily	Family	Subfamily	Genus	#mphs
Arthropoda	Chelicerata	Arachnida		Acari						26
				Araneae						24
				Opiliones						4
	Hexapoda	Collembola		Entomobryomorpha		Entomobryoidea	Actaletidae			1
							Entomobryidae			1
							Tomoceridae			1
							ND			1
				Symphypleona		Sminthuroidea	Sminthuridae	Sphyrothecinae		1
		Insecta	Pterygota	Blattodea						7
				Coleoptera			Carabidae			6
							Chrysomelidae			4
							Coccinelidae			3
							Cucujidae			4
							Elateridae			1
										2
				Dermaptera						2
				Diptera						9
				Hemiptera	Heteroptera Sternorrhyncha	Aphididae				3
										6
				Hymenoptera			Aphelinidae			2
							Braconidae			1
							Formicidae			30
							Ichneumonidae			3
							Trichogrammatidae			3
							Vespidae			1
				Isoptera						1
				Lepidoptera						4
				Orthoptera						11
				Siphonaptera						1
	Myriapoda	Chilopoda		Geophilomorpha						1
		Diplopoda	Chilognatha	Julida						1
				Polydesmida						1
Mollusca		Gastropoda	Prosobranchia	Mesogastropoda			Hydrobiidae		Cochliopina	2
			Pulmonata	Limnophila			Limnaeidae		Fossaria	1
									Stagnicola	1
							Planorbidae		Biophlaria	1

#mphs = number of morphospecies, ND = no defined.

Table S3. Correlations between soil microplastics (MPs, *n* = 66), soil glyphosate concentration (GLYsoil, *n* = 24), soil AMPA concentration (AMPAsoil, *n* = 24) and glyphosate in invertebrate tissue (GLYinv, *n* = 72) with the number of individuals per sampling point per order.

	Arachnida			Chilopoda	Collembola		Diplopoda		Gastropoda	
	Acari (#ind SP^{-1})	Araneae (#ind SP^{-1})	Opiliones (#ind SP^{-1})	Geophilomorpha (#ind SP^{-1})	Entomobryomorpha (#ind SP^{-1})	Symphypleona (#ind SP^{-1})	Julida (#ind SP^{-1})	Polydesmida (#ind SP^{-1})	Limnophila (#ind SP^{-1})	Mesogastropoda (#ind SP^{-1})
MPs (particles kg $soil^{-1}$)	−0.06	0.11	−0.12	−0.17	**0.61*****	**−0.29***	−0.17	0.05	−0.24	**−0.34****
GLYslo (mg kg $soil^{-1}$)	0.37	−0.05	0.12	ND	−0.41	ND	0.23	ND	ND	ND
AMPAslo	0.33	−0.14	0.20	ND	−0.21	ND	0.02	ND	ND	ND

	Blattodea (#ind SP⁻¹)	Coleoptera (#ind SP⁻¹)	Dermaptera (#ind SP⁻¹)	Diptera (#ind SP⁻¹)	Hemiptera (#ind SP⁻¹)	Hymenoptera. (#ind SP⁻¹)	Isoptera (#ind SP⁻¹)	Lepidoptera (#ind SP⁻¹)	Orthoptera (#ind SP⁻¹)	Siphonaptera (#ind SP⁻¹)
GLYinv (mg kg soil⁻¹)	−0.16	−0.22	−0.02	−0.04	0.06	−0.12	−0.04	−0.06	−0.06	−0.08
					Insecta					
MPs (particles kg soil⁻¹)	−0.12	0.01	**0.41***	−0.20	−0.14	0.06	−0.02	**0.36**	−0.07	−0.07
GLYslo (mg kg soil⁻¹)	ND	0.03	0.16	−0.26	0.20	−0.04	ND	−0.17	−0.23	ND
AMPAslo (mg kg soil⁻¹)	ND	0.32	−0.12	−0.25	0.26	−0.15	ND	−0.23	−0.25	ND
GLYinv (mg kg soil⁻¹)	−0.14	**−0.35**	0.06	−0.13	−0.15	0.02	−0.06	−0.04	0.10	−0.04

SP = sampling point, ND = no defined, bold = indicates statistically significant value, *P < 0.05, **P < 0.01, ***P < 0.001.

Table S4. Correlations between soil microplastics count (MPs, *n* = 66), soil glyphosate concentration (GLYsoil, *n* = 24), soil AMPA concentration (AMPAsoil, *n* = 24) and glyphosate in invertebrate tissue (GLYinv, *n* = 72) with the number of morphospecies per sampling point per order. *n* = number of sampling points for statistical analysis.

	Arachnida			**Chilopoda**	**Collembola**		**Diplopoda**		**Gastropoda**	
	Acari (#mphs SP⁻¹)	Araneae (#mphs SP⁻¹)	Opiliones (#mphs SP⁻¹)	Geophilomorpha (#mphs SP⁻¹)	Entomobryomorpha (#mphs SP⁻¹)	Symphypleona (#mphs SP⁻¹)	Julida (#mphs SP⁻¹)	Polydesmida (#mphs SP⁻¹)	Limnophila (#mphs SP⁻¹)	Mesogastropoda (#mphs SP⁻¹)
MPs (particles kg soil⁻¹)	−0.16	0.09	−0.12	−0.17	**0.41***	**−0.29***	−0.17	0.05	−0.24	**−0.34**
GLYslo (mg kg soil⁻¹)	0.27	−0.05	0.11	ND	**−0.44***	ND	ND	ND	ND	ND
AMPAslo (mg kg soil⁻¹)	0.25	−0.14	0.20	ND	−0.33	ND	ND	ND	ND	ND
GLYinv (mg kg soil⁻¹)	−0.19	−0.22	−0.02	−0.04	0.20	−0.12	−0.04	−0.06	−0.06	−0.08
					Insecta					
	Blattodea (#mphs SP⁻¹)	Coleoptera (#mphs SP⁻¹)	Dermaptera (#mphs SP⁻¹)	Diptera (#mphs SP⁻¹)	Hemiptera (#mphs SP⁻¹)	Hymenoptera (#mphs SP⁻¹)	Isoptera (#mphs SP⁻¹)	Lepidoptera (#mphs SP⁻¹)	Orthoptera (#mphs SP⁻¹)	Siphonaptera (#mphs SP⁻¹)
MPs (particles kg soil⁻¹)	−0.12	0.07	**0.39**	−0.20	−0.13	−0.04	−0.02	**0.36**	−0.07	−0.07
GLYslo (mg kg soil⁻¹)	ND	0.03	0.13	−0.26	0.20	−0.10	ND	−0.17	−0.25	ND
AMPAslo (mg kg soil⁻¹)	ND	0.32	−0.14	−0.25	0.26	−0.06	ND	−0.23	−0.24	ND
GLYinv (mg kg soil⁻¹)	−0.14	**−0.32**	0.08	−0.13	−0.15	−0.12	−0.06	−0.04	0.11	−0.04

SP = sampling point, ND = no defined, bold = indicates statistically significant value, *P < 0.05, **P < 0.01, ***P< 0.001.

Table S5. Correlations between global abundance and global diversity with relative abundance by order of above ground invertebrates (n = 72). *n* = number of sampling points for statistical analysis.

	#ind SP^{-1}	H SP^{-1}		#inds SP^{-1}	H SP^{-1}
Arachnida			**Insecta**		
Acar (#mphs SP^{-1})	0.18	0.04	Blattodea (#mphs SP^{-1})	0.20	0.11
Araneae (#mphs SP^{-1})	**0.41****	**0.26***	Coleoptera (#mphs SP^{-1})	0.23	**0.25**
Opiliones (#mphs SP^{-1})	0.05	0.11	Dermaptera (#mphs SP^{-1})	**0.30**	**−0.33**
Chilopoda			Diptera (#mphs SP^{-1})	0.06	−0.04
Geophilomorpha (#mphs SP^{-1})	0.13	0.09	Hemiptera (#mphs SP^{-1})	0.06	0.15
Collembola			Hymenoptera (#mphs SP^{-1})	**0.64*****	0.11
Entomobryomorpha (#mphs SP^{-1})	**0.38****	−0.06	Isoptera (#mphs SP^{-1})	0.19	**0.25***
Symphypleona (#mphs SP^{-1})	0.20	0.09	Lepidoptera (#mphs SP^{-1})	**0.34****	-0.05
Diplopoda			Orthoptera (#mphs SP^{-1})	**0.34****	−0.09
Julida (#mphs SP^{-1})	−0.12	−0.07	Siphonaptera (#mphs SP^{-1})	−0.07	0.20
Polydesmida (#mphs SP^{-1})	0.03	0.12			
Gastropoda					
Limnophila (#mphs SP^{-1})	−0.06	0.21			
Mesogastropoda (#mphs SP^{-1})	−0.18	0.12			

#mphs = number of morphospecies, H = Shannon diversity index, SP = sampling point, bold = indicates statistically significant value, *P < 0.05, **P < 0.01, ***P < 0.001.

Table S6. Correlations between global richness and global diversity with relative richness by order of above ground invertebrates (*n* = 72). *n* = number of sampling points for statistical analysis.

	#mphs SP⁻¹	H SP⁻¹		#mphs SP⁻¹	H SP⁻¹
Arachnida			**Insecta**		
Acar (#mphs SP⁻¹)	**0.33****	0.17	Blattodea (#mphs SP⁻¹)	0.23	0.11
Araneae (#mphs SP⁻¹)	**0.59*****	**0.29**	Coleoptera (#mphs SP⁻¹)	**0.53*****	**0.25***
Opiliones (#mphs SP⁻¹)	0.09	0.11	Dermaptera (#mphs SP⁻¹)	<0.01	**−0.34****
Chilopoda			Diptera (#mphs SP⁻¹)	0.08	−0.04
Geophilomorpha (#mphs SP⁻¹)	0.20	0.09	Hemiptera (#mphs SP⁻¹)	0.23	0.15
			Hymenoptera (#mphs SP⁻¹)	**0.70*****	**0.32****
Collembola			Isoptera (#mphs SP⁻¹)	**0.25***	**0.25***
Entomobryomorpha (#mphs SP⁻¹)	0.08	−0.10	Lepidoptera (#mphs SP⁻¹)	**0.35****	−0.06
Symphypleona (#mphs SP⁻¹)	**0.33****	0.09	Orthoptera (#mphs SP⁻¹)	**0.25***	−0.06
			Siphonaptera (#mphs SP⁻¹)	0.14	0.20
Diplopoda					
Julida (#mphs SP⁻¹)	0.05	−0.07			
Polydesmida (#mphs SP⁻¹)	0.09	0.12			
Gastropoda					
Limnophila (#mphs SP⁻¹)	0.15	0.21			
Mesogastropoda (#mphs SP⁻¹)	0.04	0.12			

#mphs = number of morphospecies, H = Shannon diversity index, SP = sampling point, bold = indicates statistically significant value, *P < 0.05, **P < 0.01, ***P < 0.001.

Table S7. Correlation between number of individuals per sampling point (#ind.SP⁻¹) per orders of soil invertebrates (*n* = 72). *n* = number of sampling points for statistical analysis.

	Arachnida			Chilopoda	Collembola		Diplopoda		Gastropoda	
	Acari (#ind SP⁻¹)	Araneae (#ind SP⁻¹)	Opiliones (#ind SP⁻¹)	Geophilomorpha (#ind SP⁻¹)	Entomobryomorpha (#ind SP⁻¹)	Symphypleona (#ind SP⁻¹)	Julida (#ind SP⁻¹)	Polydesmida (#ind SP⁻¹)	Limnophila (#ind SP⁻¹)	Mesogastropoda (#ind SP⁻¹)
Arachnida										
Acar (#mphs SP⁻¹)		−0.07	−0.06	0.12	0.07	0.18	0.04	−0.06	0.05	0.07
Araneae (#mphs SP⁻¹)	−0.07		0.10	0.20	0.12	0.11	0.05	0.07	0.19	0.10
Opiliones (#mphs SP⁻¹)	−0.06	0.10		−0.03	**−0.26***	0.09	−0.03	−0.05	−0.05	−0.07
Chilopoda										
Geophilomorpha (#mphs SP⁻¹)	0.12	0.20	−0.03		<−0.01	**0.36****	−0.01	−0.02	−0.02	−0.03
Collembola										
Entomobryomorpha (#mphs SP⁻¹)	0.07	0.12	**−0.26***	<−0.01		**−0.28***	<−0.01	0.10	−0.14	**−0.26***
Symphypleona (#mphs SP⁻¹)	0.18	0.11	0.09	**0.36****	**−0.28***		−0.04	−0.06	0.22	0.10
Diplopoda										
Julida (#mphs SP⁻¹)	0.04	0.05	−0.03	−0.01	<−0.01	−0.04		−0.02	−0.02	−0.03
Polydesmida (#mphs SP⁻¹)	−0.06	0.07	−0.05	−0.02	0.10	−0.06	−0.02		−0.03	−0.04
Gastropoda										
Limnophila (#mphs SP⁻¹)	0.05	0.19	−0.05	−0.02	−0.14	0.22	−0.02	−0.03		**0.68*****
Mesogastropoda (#mphs SP⁻¹)	0.07	0.10	−0.07	−0.03	**−0.26***	0.10	−0.03	−0.04	**0.68*****	

#ind = number of individuals, SP = sampling point, bold = indicates statistically significant value, *P < 0.05, **P ≤ 0.001, ***P ≤ 0.0001.

	Arachnida			Chilopoda	Collembola		Diplopoda		Gastropoda	
	Acari (#ind SP⁻¹)	Araneae (#ind SP⁻¹)	Opiliones (#ind SP⁻¹)	Geophilomorpha (#ind SP⁻¹)	Entomobryomorpha (#ind SP⁻¹)	Symphypleona (#ind SP⁻¹)	Julida (#ind SP⁻¹)	Polydesmida (#ind SP⁻¹)	Limnophila (#ind SP⁻¹)	Mesogastropoda (#ind SP⁻¹)
Insecta										
Blattodea (#ind SP⁻¹)	−0.08	−0.20	0.04	−0.05	−0.16	0.14	−0.05	−0.07	−0.07	−0.10
Coleoptera (#ind SP⁻¹)	0.07	**0.49*****	0.02	0.15	<1e⁻³	0.04	−0.10	0.17	−0.14	−0.11
Dermaptera (#ind SP⁻¹)	**0.33****	0.06	−0.16	−0.07	**0.40*****	−0.20	0.16	−0.10	−0.10	−0.14
Diptera (#ind SP⁻¹)	0.09	−0.08	**0.28***	−0.06	−0.05	0.16	−0.06	−0.08	−0.08	0.03
Hemiptera (#ind SP⁻¹)	0.04	0.11	−0.12	**0.27***	**−0.26***	0.23	−0.05	−0.07	−0.07	0.06
Hymenoptera (#ind SP⁻¹)	−0.18	**0.32****	0.11	0.15	−0.08	0.19	−0.08	0.08	0.05	−0.03
Isoptera (#ind SP⁻¹)	0.03	0.13	−0.05	−0.02	−0.01	0.19	−0.02	−0.03	−0.03	−0.04
Lepidoptera (#ind SP⁻¹)	−0.15	**0.24***	−0.10	−0.04	0.14	0<.01	−0.04	−0.06	−0.06	−0.09
Orthoptera (#ind SP⁻¹)	−0.17	<−0.01	0.09	0.14	−0.15	0.13	0.14	0.04	−0.12	−0.17
Siphonaptera (#ind SP⁻¹)	−0.13	0.20	**0.46*****	−0.01	−0.15	−0.04	−0.01	−0.02	−0.02	−0.03

#ind = number of individuals, SP = sampling point, bold = indicates statistically significant value, *P < 0.05, **P ≤ 0.001, ***P ≤ 0.0001.

	Insecta									
	Blattodea (#ind SP⁻¹)	**Coleoptera** (#ind SP⁻¹)	**Dermaptera** (#ind SP⁻¹)	**Diptera** (#ind SP⁻¹)	**Hemiptera** (#ind SP⁻¹)	**Hymenoptera** (#ind SP⁻¹)	**Isoptera** (#ind SP⁻¹)	**Lepidoptera** (#ind SP⁻¹)	**Orthoptera** (#ind SP⁻¹)	**Siphonaptera** (#ind SP⁻¹)
Arachnida										
Acar (#mphs SP⁻¹)	−0.08	0.07	**0.33****	0.09	0.04	−0.18	0.03	−0.15	−0.17	−0.13
Araneae (#mphs SP⁻¹)	−0.20	**0.49*****	0.06	−0.08	0.11	**0.32****	0.13	**0.24***	<−0.01	0.20
Opiliones (#mphs SP⁻¹)	0.04	0.02	−0.16	**0.28***	−0.12	0.11	−0.05	−0.10	0.09	**0.46*****
Chilopoda										
Geophilomorpha (#mphs SP⁻¹)	−0.05	0.15	−0.07	−0.06	**0.27***	0.15	−0.02	−0.04	0.14	−0.01
Collembola										
Entomobryomorpha (#mphs SP⁻¹)	−0.16	<5e⁻⁴	**0.40*****	−0.05	**−0.26***	−0.08	−0.01	0.14	−0.15	−0.15

Symphypleona (#mphs SP⁻¹)	0.14	0.04	−0.20	0.16	0.23	0.19	0.19	<0.01	0.13	−0.04
Diplopoda										
Julida (#mphs SP⁻¹)	−0.05	−0.10	0.16	−0.06	−0.05	−0.08	−0.02	−0.04	0.14	−0.01
Polydesmida (#mphs SP⁻¹)	−0.07	0.17	−0.10	−0.08	−0.07	0.08	−0.03	−0.06	0.04	−0.02
Gastropoda										
Limnophila (#mphs SP⁻¹)	−0.07	−0.14	−0.10	−0.08	−0.07	0.05	−0.03	−0.06	−0.12	−0.02
Mesogastropoda (#mphs SP⁻¹)	−0.10	−0.11	−0.14	0.03	0.06	−0.03	−0.04	−0.09	−0.17	−0.03

#ind = number of individuals, SP = sampling point, bold = indicates statistically significant value, *P < 0.05, **P ≤ 0.001, ***P ≤ 0.0001.

	Insecta									
	Blattodea (#ind SP⁻¹)	**Coleoptera** (#ind SP⁻¹)	**Dermaptera** (#ind SP⁻¹)	**Diptera** (#ind SP⁻¹)	**Hemiptera** (#ind SP⁻¹)	**Hymenoptera** (#ind SP⁻¹)	**Isoptera** (#ind SP⁻¹)	**Lepidoptera** (#ind SP⁻¹)	**Orthoptera** (#ind SP⁻¹)	**Siphonaptera** (#ind SP⁻¹)
Insecta										
Blattodea (#ind SP⁻¹)		0.02	−0.14	0.10	0.17	**0.32****	0.17	**0.23***	**0.35****	−0.05
Coleoptera (#ind SP⁻¹)	0.02		−0.02	−0.09	**0.27***	0.12	0.12	0.10	−0.07	0.15
Dermaptera (#ind SP⁻¹)	−0.14	−0.02		−0.06	−0.17	−0.21	−0.10	−0.02	−0.13	−0.07
Diptera (#ind SP⁻¹)	0.10	−0.09	−0.06		−0.12	−0.04	0.12	−0.06	−0.10	−0.06
Hemiptera (#ind SP⁻¹)	0.17	**0.27***	−0.17	−0.12		0.18	0.19	0.10	0.09	−0.05
Hymenoptera (#ind SP⁻¹)	**0.32****	0.12	−0.21	−0.04	0.18		0.18	**0.41*****	**0.46*****	−0.03
Isoptera (#ind SP⁻¹)	0.17	0.12	−0.10	0.12	0.19	0.18		**0.24***	0.04	−0.02
Lepidoptera (#ind SP⁻¹)	**0.23***	0.10	−0.02	−0.06	0.10	**0.41*****	**0.24***		0.12	−0.04
Orthoptera (#ind SP⁻¹)	**0.35****	−0.07	−0.13	−0.10	0.09	**0.46*****	0.04	0.12		−0.08
Siphonaptera (#ind SP⁻¹)	−0.05	0.15	−0.07	−0.06	−0.05	−0.03	−0.02	−0.04	−0.08	

#ind = number of individuals, SP = sampling point, bold = indicates statistically significant value, *P < 0.05, **P ≤ 0.001, ***P ≤ 0.0001.

Table S8. Correlation between number of morphospecies per sampling point (#mphs.SP⁻¹) per orders of above ground invertebrates (= 72). n = number of sampling points for statistical analysis.

	Arachnida			Chilopoda	Collembola		Diplopoda		Gastropoda	
	Acari (#mphs SP⁻¹)	Araneae (#mphs SP⁻¹)	Opiliones (#mphs SP⁻¹)	Geophilomorpha (#mphs SP⁻¹)	Entomobryomorpha (#mphs SP⁻¹)	Symphypleona (#mphs SP⁻¹)	Julida (#mphs SP⁻¹)	Polydesmida (#mphs SP⁻¹)	Limnophila (#mphs SP⁻¹)	Mesogastropoda (#mphs SP⁻¹)
Arachnida										
Acar (#mphs SP⁻¹)		−0.02	−0.11	0.19	0.00	**0.34****	0.09	−0.03	0.11	0.08
Araneae (#mphs SP⁻¹)	−0.02		0.12	0.21	0.00	0.11	0.06	0.07	0.21	0.12
Opiliones (#mphs SP⁻¹)	−0.11	0.12		−0.03	**−0.28***	0.07	−0.03	−0.05	−0.05	−0.07
Chilopoda										
Geophilomorpha (#mphs SP⁻¹)	0.19	0.21	−0.03		−0.01	**0.34****	−0.01	−0.02	−0.02	−0.03
Collembola										
Entomobryomorpha (#mphs SP⁻¹)	0.00	0.00	**−0.28***	−0.01		**−0.24***	0.12	0.13	−0.11	**−0.24***
Symphypleona (#mphs SP⁻¹)	**0.34****	0.11	0.07	**0.34****	**−0.24***		−0.04	−0.06	0.21	0.10
Diplopoda										
Julida (#mphs SP⁻¹)	0.09	0.06	−0.03	−0.01	0.12	−0.04		−0.02	−0.02	−0.03
Polydesmida (#mphs SP⁻¹)	−0.03	0.07	−0.05	−0.02	0.13	−0.06	−0.02		−0.03	−0.04
Gastropoda										
Limnophila (#mphs SP⁻¹)	0.11	0.21	−0.05	−0.02	−0.11	0.21	−0.02	−0.03		**0.68*****
Mesogastropoda (#mphs SP⁻¹)	0.08	0.12	−0.07	−0.03	**−0.24***	0.10	−0.03	−0.04	**0.68*****	

#mphs = number of morphospecies, SP = sampling point, bold = indicates statistically significant value, *$P < 0.05$, **$P \le 0.001$, ***$P \le 0.0001$.

	Arachnida			Chilopoda	Collembola		Diplopoda		Gastropoda	
	Acari (#mphs SP⁻¹)	Araneae (#mphs SP⁻¹)	Opiliones (#mphs SP⁻¹)	Geophilomorpha (#mphs SP⁻¹)	Entomobryomorpha (#mphs SP⁻¹)	Symphypleona (#mphs SP⁻¹)	Julida (#mphs SP⁻¹)	Polydesmida (#mphs SP⁻¹)	Limnophila (#mphs SP⁻¹)	Mesogastropoda (#mphs SP⁻¹)
Insecta										
Blattodea (#ind SP⁻¹)	−0.03*	−0.23	0.04	−0.05	−0.13	0.13	−0.05	−0.07	−0.07	−0.10
Coleoptera (#ind SP⁻¹)	0.22	**0.50*****	<−5e⁻³	0.10	−0.05	0.03	−0.10	0.20	−0.14	−0.10
Dermaptera (#ind SP⁻¹)	0.13	0.07	−0.16	−0.07	**0.29***	−0.20	0.19	−0.10	−0.10	−0.14
Diptera (#ind SP⁻¹)	0.05	−0.06	**0.28***	−0.06	0.00	0.15	−0.06	−0.08	−0.08	0.03
Hemiptera (#ind SP⁻¹)	0.08	0.12	−0.12	**0.27***	**−0.32****	**0.25***	−0.05	−0.07	−0.07	0.07
Hymenoptera (#ind SP⁻¹)	−0.15	**0.30***	0.08	0.15	−0.09	0.13	−0.14	0.09	0.14	0.03
Isoptera (#ind SP⁻¹)	0.06	0.15	−0.05	−0.02	−0.02	0.21	−0.02	−0.03	−0.03	−0.04
Lepidoptera (#ind SP⁻¹)	−0.10	0.15	−0.10	−0.04	**0.27***	0.02	−0.04	−0.06	−0.06	−0.09
Orthoptera (#ind SP⁻¹)	−0.12	−0.03	0.03	0.16	−0.08	0.12	0.16	0.06	−0.12	−0.17
Siphonaptera (#ind SP⁻¹)	−0.13	0.22	0.46	−0.01	−0.15	−0.04	−0.01	−0.02	−0.02	−0.03

#mphs = number of morphospecies, SP = sampling point, bold = indicates statistically significant value, *$P < 0.05$, **$P \le 0.001$, ***$P \le 0.0001$.

	Insecta									
	Blattodea (#mphs SP⁻¹)	Coleoptera (#mphs SP⁻¹)	Dermaptera (#mphs SP⁻¹)	Diptera (#mphs SP⁻¹)	Hemiptera (#mphs SP⁻¹)	Hymenoptera (#mphs SP⁻¹)	Isoptera (#mphs SP⁻¹)	Lepidoptera (#mphs SP⁻¹)	Orthoptera (#mphs SP⁻¹)	Siphonaptera (#mphs SP⁻¹)
Arachnida										
Acar (#mphs SP⁻¹)	−0.03	0.22	0.13	0.05	0.08	−0.15	0.06	−0.10	−0.12	−0.13
Araneae (#mphs SP⁻¹)	−0.23	**0.50*****	0.07	−0.06	0.12	**0.30***	0.15	0.15	−0.03	0.22
Opiliones (#mphs SP⁻¹)	0.04	<−5e⁻³	−0.16	**0.28***	−0.12	0.08	−0.05	−0.10	0.03	**0.46*****
Chilopoda										
Geophilomorpha (#mphs SP⁻¹)	−0.05	0.10	−0.07	−0.06	**0.27***	0.15	−0.02	−0.04	0.16	−0.01
Collembola										

Entomobryomorpha (#mphs SP⁻¹)	−0.13	−0.05	**0.29***	0.00	**−0.32****	−0.09	−0.02	**0.27***	−0.08	−0.15
Symphypleona (#mphs SP⁻¹)	0.13	0.03	−0.20	0.15	**0.25***	0.13	0.21	0.02	0.12	−0.04
Diplopoda										
Julida (#mphs SP⁻¹)	−0.05	−0.10	0.19	−0.06	−0.05	−0.14	−0.02	−0.04	0.16	−0.01
Polydesmida (#mphs SP⁻¹)	−0.07	0.20	−0.10	−0.08	−0.07	0.09	−0.03	−0.06	0.06	−0.02
Gastropoda										
Limnophila (#mphs SP⁻¹)	−0.07	−0.14	−0.10	−0.08	−0.07	0.14	−0.03	−0.06	−0.12	−0.02
Mesogastropoda (#mphs SP⁻¹)	−0.10	−0.10	−0.14	0.03	0.07	0.03	−0.04	−0.09	−0.17	−0.03

#mphs = number of morphospecies, SP = smpling point, bold = indicates statistically significant value, *P < 0.05, **P ≤ 0.001, ***P ≤ 0.0001.

	Insecta									
	Blattodea (#mphs SP⁻¹)	**Coleoptera** (#mphs SP⁻¹)	**Dermaptera** (#mphs SP⁻¹)	**Diptera** (#mphs SP⁻¹)	**Hemiptera** (#mphs SP⁻¹)	**Hymenoptera** (#mphs SP⁻¹)	**Isoptera** (#mphs SP⁻¹)	**Lepidoptera** (#mphs SP⁻¹)	**Orthoptera** (#mphs SP⁻¹)	**Siphonaptera** (#mphs SP⁻¹)
Insecta										
Blattodea (#ind SP⁻¹)		−0.01	−0.14	0.10	0.15	**0.34****	0.17	**0.24***	**0.29***	−0.05
Coleoptera (#ind SP⁻¹)	−0.01		−0.05	−0.09	**0.29***	0.21	0.14	0.12	−0.04	0.10
Dermaptera (#ind SP⁻¹)	−0.14	−0.05		−0.04	−0.16	**−0.29***	−0.10	0.02	−0.12	−0.07
Diptera (#ind SP⁻¹)	0.10	−0.09	−0.04		−0.12	−0.06	0.12	−0.07	−0.14	−0.06
Hemiptera (#ind SP⁻¹)	0.15	**0.29***	−0.16	−0.12		0.14	0.20	0.11	0.12	−0.05
Hymenoptera (#ind SP⁻¹)	**0.34****	0.21	**−0.29***	−0.06	0.14		0.16	**0.29***	**0.36****	0.08
Isoptera (#ind SP⁻¹)	0.17	0.14	−0.10	0.12	0.20	0.16		0.21	0.06	−0.02
Lepidoptera (#ind SP⁻¹)	**0.24***	0.12	0.02	−0.07	0.11	**0.29***	0.21		0.12	−0.04
Orthoptera (#ind SP⁻¹)	**0.29***	−0.04	−0.12	−0.14	0.12	**0.36****	0.06	0.12		−0.08
Siphonaptera (#ind SP⁻¹)	−0.05	0.10	−0.07	−0.06	−0.05	0.08	−0.02	−0.04	−0.08	

#mphs = number of morphospecies, SP = sampling point, bold = indicates statistically significant value, *P < 0.05, **P ≤ 0.001, ***P ≤ 0.0001.