Supplementary information

Fig.1S Layout of 72 mesocosms assigned to three experimental treatments: 1) biochar (+ or − at 2 % w/w); 2) crop type (barley, perennial ryegrass, or unvegetated); and 3) soil texture (sandy clay, sandy silt loam, clay loam) placed in an outdoor exclosure at the Centre for Ecology and Hydrology (CEH) in Penicuik, UK (55° 51’ N, 3° 12’ W, 189 metres above sea level).

Table 1S. Spearman correlation coefficients between edaphic properties, plant biomass and the soil biota. * P < 0.05, ** P < 0.01 and *** P < 0.001.

	AG Biomass	Soil C content	Soil N content	Soil C:N	Soil pH	Nematode density	Soil fungi: bacteria	Mite density	Root biomass	Collembolan density	Total PLFA
Soil moisture	-0.01	-0.01	0.13	***-0.15**	0.11	0.03	0.03	0.03	****0.23**	0.08	*****0.25**
AG Biomass		-0.01	****-0.22**	***0.17**	-0.09	*****0.25**	0.12	-0.08	0.39	****0.20**	*****0.33**
Soil C content			***0.15**	*****0.59**	*****0.74**	-0.12	***0.15**	0.07	-0.13	*****0.30**	-0.07
Soil N content				*****-0.67**	*****0.30**	0.05	0.01	0.09	-0.03	0.05	0.06
Soil C:N					*****0.28**	-0.09	0.09	-0.01	-0.09	*0.15	-0.11
Soil pH						****-0.22**	0.07	0.02	***-0.16**	*****0.25**	****-0.18**
Nematode density							***0.16**	0.02	*****0.30**	***0.17**	*****0.43**
Soil fungi: bacteria								0.06	*****0.37**	*****0.38**	*****0.70**
Mite density									0.03	-0.09	0.06
Root biomass										*****0.43**	*****0.64**
Collem. density											*****0.42**

Table 2S. All tests from a linear mixed model (LMM) of the response of soil carbon content (total C and adjusted C_A to account for the proportion of C added to the soil as biochar) to experimental treatments and covariates. Values are estimates of fixed effects and type III (adjusted for other significant terms) *F* & *p* statistics α =0.05. Annual measurements of soil carbon (n = 3) at the mesocosm level were accounted for using an autoregressive AR(1) structure. × = interaction. Biochar (+) vs Control (−); SZL: sandy silt loam, CL: clay loam, SC: sandy clay; Collembola, Acari or Nematoda = density of these soil invertebrates. Bold text indicates significant terms retained in final LMM α =0.05, interactions only reported where significant or marginally non-significant (i.e. *p* = 0.05).

Response	Fixed effect	Class	Estimate	$F_{(ndf, ddf)}$	*p*
Soil carbon (C) content	**Intercept**		**2.385 ± 0.236**		
%	**Soil texture**	**SZL**	**1.59 ± 0.17**	**$63.04_{(2,125)}$**	**< 0.0001**
Random effects:		**CL**	**0.78 ± 0.18**		
Spatial block = 0.0005		**SC**	**0**		
Mesocosm AR(1) = 0.008	**Biochar**	**+**	**0.82 ± 0.13**	**$155.33_{(1,71)}$**	**< 0.0001**
Residual variance = 0.278		**−**	**0**		
	Nematoda		**-0.0004 ± 0.021**	**$6.80_{(1,182)}$**	**0.010**
	Crop type	**Barley**	**-0.59 ± 0.28**	**$3.94_{(2,69)}$**	**0.024**
		Ryegrass	**0.13 ± 0.28**		
		Unvegetated	**0**		
	Fungi:bacteria		-0.74 ± 0.48	$0.02_{(1,69)}$	0.884
	Biochar ×	**+ × SLZ**	**-0.14 ± 0.19**	**$7.28_{(2,72)}$**	**0.001**
	Soil texture	**+ × CL**	**0.55 ± 0.19**		
		+ × SC	**0**		
		− × SZL	**0**		
		− × CL	**0**		
		− × SC	**0**		
	Nematoda ×	**SZL**	**0.006 ± 0.032**	**$4.72_{(2,182)}$**	**0.010**
	Soil texture	**CL**	**-0.201 ± 0.070**		
		SC	**0**		
	Fungi:bacteria ×	Barley	1.56 ± 0.64	$3.18_{(2,70)}$	0.048
	crop type	Ryegrass	0.56 ± 0.54		
		Unvegetated	0		
	Year			$0.43_{(2,133)}$	0.650
	Collembola			$2.16_{(1,76)}$	0.145
	Acari			$0.32_{(1,68)}$	0.576
	Crop biomass			$0.06_{(1,171)}$	0.804
	Soil moisture			$0.07_{(1,181)}$	0.795
	Soil N content %			$0.00_{(1,102)}$	0.996
Adjusted soil C_A content					
%	**Soil texture**	**SZL**	**1.60 ± 0.13**	**$128.00_{(2,77)}$**	**< 0.0001**
Random effects estimate:		**CL**	**0.58 ± 0.13**		
Spatial block = 0		**SC**	**0**		
Mesocosm AR(1) = 0.073	**Biochar**	**+**	**-0.71 ± 0.13**	**$63.62_{(1,77)}$**	**< 0.0001**
Residual variance = 0.287		**−**	**0**		
	Collembola		**0.78 ± 0.29**	**$7.25_{(1,78)}$**	**0.009**
	Biochar ×	**+ × SZL**	**-0.141 ± 0.189**	**$4.26_{(2,78)}$**	**0.018**
	Soil texture	**+ × CL**	**0.403 ± 0.190**		
		+ × SC	**0**		
		− × SZL	**0**		
		− × CL	**0**		
		− × SC	**0**		
	Nematoda			$0.27_{(1,196)}$	0.605
	Acari			$0.00_{(1,74)}$	0.957
	Crop biomass			$0.01_{(1,202)}$	0.933
	Soil moisture			$0.01_{(1,193)}$	0.942
	Year			$0.17_{(2,141)}$	0.845
	Soil N content %			$0.10_{(1,105)}$	0.747

Table 3S. All tests from a linear mixed model (LMM) of the response of soil microbial biomass (PLFA analysis) to experimental treatments and covariates. Values are estimates of fixed effects and type III (adjusted for other significant terms) *F* & *p* statistics α =0.05. × = interaction. Biochar (+) vs Control (−); SZL: sandy silt loam, CL: clay loam, SC: sandy clay; Collembola, Acari or Nematoda = density of these soil invertebrates. Bold text indicates significant terms retained in final LMM α =0.05, interactions only reported where significant or marginally (i.e. *p* = 0.05) non-significant.

Response	Fixed effect	Class	Estimate	$F_{(ndf, ddf)}$	*p*
Fungal-to-bacterial ratio	**Intercept**		**3.709 ± 1.126**		
	Crop type	**Barley**	**-0.752 ± 0.439**	**$3.00_{(2,54)}$**	**0.058**
Random effects:		**Ryegrass**	**-1.097 ± 0.466**		
Spatial block = 0		**Unvegetated**	**0**		
Residual variance = 0.024	**Soil texture**	**SZL**	**2.306 ± 0.588**	**$8.70_{(2,54)}$**	**0.0005**
		CL	**1.559 ± 0.583**		
		SC	**0**		
	Biochar	**+**	**0.196 ± 0.067**	**$8.53_{(1,54)}$**	**0.005**
		–	**0**		
	Acari		0.016 ± 0.345	$3.01_{(1,54)}$	0.089
	Soil pH		**-0.673 ± 0.204**	**$10.92_{(1,54)}$**	**0.002**
	Soil N content		**-0.958 ± 1.950**	**$4.22_{(1,54)}$**	**0.045**
	Soil moisture		0.045 ± 0.024	$1.68_{(1,54)}$	0.201
	Acari × crop type	**Barley**	**-0.507 ± 0.413**	**$10.77_{(2,54)}$**	**0.0001**
		Ryegrass	**1.468 ± 0.467**		
		Unvegetated	**0**		
	Soil N content × crop type	**Barley**	**4.977 ± 2.444**	**$3.77_{(2,54)}$**	**0.029**
		Ryegrass	**6.610 ± 2.538**		
		Unvegetated	**0**		
	Soil moisture × soil texture	**SZL**	**-0.131 ± 0.041**	**$5.59_{(2,54)}$**	**0.006**
		CL	**-0.083 ± 0.040**		
		SC	0		
	Crop biomass			$0.00_{(1,51)}$	0.966
	Nematoda			$0.82_{(1,53)}$	0.369
	Collembola			$0.01_{(1,53)}$	0.908
Total PLFA	**Intercept**		**35800 ± 1900**		
Random effects:	**Crop type**	**Barley**	**5055 ± 2624**	**$25.61_{(2,60)}$**	**< 0.0001**
Spatial block = 0		**Ryegrass**	**14366 ± 2981**		
Residual variance =		**Unvegetated**	**0**		
2.17 x 10^7	**Soil texture**	**SZL**	**-12081 ± 2684**	**$19.17_{(2,60)}$**	**<0.0001**
		CL	**-6909 ± 2336**		
		SC	**0**		
	Biochar			$0.10_{(1,59)}$	0.754
	Acari			$1.99_{(1,60)}$	0.163
	Crop type × soil texture	**Barley × SZL**	**10302 ± 3624**	**$5.84_{(4,60)}$**	**0.0005**
		Barley ×CL	**-906 ± 3300**		
		Barley ×SC	**0**		
		Ryegrass × SZL	**12654 ± 3575**		
		Ryegrass ×CL	**-3388 ± 3302**		
		Ryegrass ×SC	**0**		
		Unvegetated × SZL	**0**		
		Unvegetated ×CL	**0**		
		Unvegetated ×SC	**0**		
	Acari × crop type	**Barley**	**-33154 ± 12770**	**$8.44_{(2,60)}$**	**0.0006**
		Ryegrass	**15143 ± 13916**		
		Unvegetated	**0**		
	Soil pH			$0.53_{(1,59)}$	0.469
	Soil N content			$0.09_{(1,59)}$	0.763
	Soil moisture			$0.24_{(1,57)}$	0.623
	Crop biomass			$0.05_{(1,57)}$	0.828

	Nematoda			$0.74_{(1,57)}$	0.393
	Collembola			$0.09_{(1,59)}$	0.761
Arbuscular Mycorrhizal Fungi (AMF 16:1ω5)	**Intercept**		**978.8 ±143.2**		
Random effects:	Biochar	+	-6.5 ± 78.2	$0.01_{(1,64)}$	0.934
Spatial block = 0		–	0		
Residual variance = 39218	**Crop type**	**Barley**	**281.3 ± 57.5**	**$114.78_{(2,64)}$**	**< 0.0001**
		Ryegrass	**947.2 ± 63.5**		
		Unvegetated	**0**		
	Soil texture	**SZL**	**-194.8 ± 58.8**	**$5.65_{(2,64)}$**	**0.006**
		CL	**-68.4 ± 58.6**		
		SC	**0**		
	Collembola		-303.6 ± 271.8	$0.47_{(1,64)}$	0.500
	Collembola × biochar	**+**	**870.0 ± 345.3**	**$6.35_{(1,64)}$**	**0.014**
		–	**0**		
	Soil pH			$1.84_{(1,63)}$	0.180
	Acari			$0.12_{(1,63)}$	0.727
	Soil N content			$0.16_{(1,63)}$	0.691
	Soil moisture			$2.04_{(1,61)}$	0.158
	Crop biomass			$2.96_{(1,61)}$	0.090
	Nematoda			$1.77_{(1,61)}$	0.188

Table 4S. All tests from a linear mixed model (LMM) of the response of soil invertebrate densities (n g^{-1} soil) to experimental treatments and covariates. Values are estimates of fixed effects and type III (adjusted for other significant terms) *F* & *p* statistics α =0.05. Annual measurements of nematoda (n = 3) at the mesocosm level were accounted for using an autoregressive AR(1) structure. × = interaction. Biochar (+) vs Control (−); SZL: sandy silt loam, CL: clay loam, SC: sandy clay; Collembola, Acari or Nematoda = density of these soil invertebrates. Bold text indicates significant terms retained in final LMM α =0.05, interactions only reported where significant or marginally (i.e. *p* = 0.05) non-significant.

Response	Fixed effect	Class	Estimate	$F_{(ndf, ddf)}$	*p*
Nematode density	**Intercept**		**0.887 ± 0.279**		
Random effects:	**Soil texture**	**SZL**	**-1.121 ± 0.291**	**$11.38_{(2,150)}$**	**<0.0001**
Spatial block = 0.004		**CL**	**-1.737 ± 0.320**		
Mesocosm AR(1) = -0.043		**SC**	**0**		
Residual variance = 0.094	**Crop type**	**Barley**	**-0.169 ± 0.088**	**$11.78_{(2,91)}$**	**<0.0001**
		Ryegrass	**0.004 ± 0.091**		
		Unvegetated	**0**		
	Biochar	+	-0.090	$4.00_{(1,97)}$	0.048
		–	0		
	Soil moisture		**-0.008 ± 0.012**	**$7.28_{(1,187)}$**	**0.008**
	Year	**2011**	**-0.037 ± 0.097**	**$10.45_{(2,188)}$**	**<0.0001**
		2012	**-0.420 ± 0.145**		
		2013	**0**		
	Soil N content			$0.000_{(1,184)}$	0.985
	Soil moisture	**SZL**	**0.040 ± 0.015**	**$12.24_{(2,188)}$**	**<0.0001**
	× soil texture	**CL**	**0.086 ± 0.018**		
		SC	**0**		
	Plant type	**Barley × SZL**	**0.403 ± 0.125**	**$4.86_{(4,84)}$**	**0.001**
	× soil texture	**Barley × CL**	**0.383 ± 0.124**		
		Barley × SC	**0**		
		Ryegrass × SZL	**0.483 ± 0.128**		
		Ryegrass × CL	**0.318 ± 0.131**		
		Ryegrass × SC	**0**		
		Unvegetated × SZL	**0**		
		Unvegetated × CL	**0**		
		Unvegetated × SC	**0**		
	Soil N content	SZL	-0.188 ± 0.802	$3.14_{(2,124)}$	0.047
	× soil texture	CL	-1.959 ± 0.846		
		SC	0		
	Collembola			$3.39_{(1,80)}$	0.069
	Soil pH			$0.41_{(1,178)}$	0.523
	Crop biomass			$0.06_{(1,176)}$	0.810
	Fungi:bacteria			$1.03_{(1,77)}$	0.312
	Acari			$0.57_{(1,78)}$	0.452
Collembolan density	**Intercept**		**-0.272 ± 0.856**		
Random effects:	**Crop type**	**Barley**	**0.009 ± 0.037**	**$9.64_{(2,64)}$**	**0.0002**
Spatial block = 0		**Ryegrass**	**0.140 ± 0.036**		
Residual variance = 0.014		**Unvegetated**	**0**		
	Soil pH		0.062 ± 0.146	$0.98_{(1,64)}$	0.327
	Soil texture	**SZL**	**1.640 ± 1.400**	**$3.94_{(2,64)}$**	**0.024**
		CL	**-1.953 ± 1.152**		
		SC	**0**		
	Soil texture × pH	**SZL**	**-0.248 ± 0.224**	**$3.97_{(2,64)}$**	**0.024**
		CL	**0.315 ± 0.190**		
		SC	**0**		
	Biochar			$0.34_{(1,63)}$	0.560
	Crop biomass			$3.12_{(1,61)}$	0.082
	Soil N content			$0.24_{(1,63)}$	0.627
	Fungi:bacteria			$0.30_{(1,63)}$	0.586
	Soil moisture			$1.36_{(1,61)}$	0.248
	Acari			$2.40_{(1,63)}$	0.127

Mite density			
Random effects:	Crop type	$0.58_{(2,68)}$	0.561
Spatial block = 0.0004	Soil texture	$2.48_{(2,68)}$	0.091
Residual variance =	Biochar	$0.07_{(1,69)}$	0.799
0.0131	Crop biomass	$1.86_{(1,67)}$	0.177
	Fungi:bacteria	$1.64_{(1,69)}$	0.204
	Soil pH	$3.28_{(1,69)}$	0.074
	Soil moisture	$1.31_{(1,68)}$	0.257
	Soil N content	$1.84_{(1,69)}$	0.179
	Collembola	$0.65_{(1,69)}$	0.424

Table 5S. All tests from a linear mixed model (LMM) of the response of plant biomass (n g^{-1} soil) to experimental treatments and covariates. Values are estimates of fixed effects and type III (adjusted for other significant terms) *F* & *p* statistics α =0.05. Yearly measurements of aboveground plant biomass (n = 3) at the mesocosm level were accounted for using an autoregressive AR(1) structure. × = interaction. Biochar (+) vs Control (−); SZL: sandy silt loam, CL: clay loam, SC: sandy clay; Collembola, Acari or Nematoda = density of these soil invertebrates. Bold text indicates significant terms retained in final LMM α =0.05, interactions only reported where significant or marginally (i.e. *p* = 0.05) non-significant.

Response	Fixed effect	Class	Estimate	$F_{(ndf, ddf)}$	*p*
Aboveground plant biomass	**Intercept**		**0.831 ± 0.238**		
Random effects:	**Crop type**	**Barley**	**0.896 ± 0.194**	**21.31$_{(1,113)}$**	**<0.0001**
Spatial block = 0.0007		**Ryegrass**	**0**		
Mesocosm AR(1) = 0.087	**Soil texture**	**SZL**	**-0.378 ± 0.157**	**6.68$_{(2,101)}$**	**0.002**
Residual variance = 0.043		**CL**	**-0.531 ± 0.148**		
		SC	**0**		
	Year	**2011**	**-0.258 ± 0.081**	**38.17$_{(2,118)}$**	**<0.0001**
		2012	**-0.918 ± 0.114**		
		2013	**0**		
	Soil moisture		**-0.003 ± 0.010**	**4.61$_{(1,117)}$**	**0.034**
	Nematoda		**-0.024 ± 0.009**	**7.98$_{(1,118)}$**	**0.006**
	Acari		**0.929 ± 0.573**	**4.52$_{(1,58)}$**	**0.038**
	Soil nitrogen content			1.08$_{(1,117)}$	0.300
	Soil moisture × crop type	**Barley**	**0.041 ± 0.010**	**17.77$_{(1,115)}$**	**<0.0001**
		Ryegrass	**0**		
	Nitrogen content × crop type	**Barley**	**-6.57 ± 0.546**	**97.9$_{(1,145)}$**	**<0.0001**
		Ryegrass	**0**		
	Nitrogen content × soil texture	**SZL**	**1.414 ± 0.601**	**6.67$_{(2,79)}$**	**0.002**
		CL	**2.338 ± 0.661**		
		SC	**0**		
	Acari × crop type	**Barley**	**0.885 ± 0.428**	**4.27$_{(1,58)}$**	**0.043**
		Ryegrass	**0**		
	Acari × soil texture	**SZL**	**-1.641 ± 0.605**	**3.68$_{(2,57)}$**	**0.031**
		CL	**-1.135 ± 0.581**		
		SC	**0**		
	Collembola			0.43$_{(1,57)}$	0.512
	Fungi:bacteria			2.29$_{(1,53)}$	0.136
	Biochar	+/-		0.19$_{(1,62)}$	0.666
	Soil pH			0.05$_{(1,89)}$	0.823
Root biomass	**Intercept**		**0.0006 ± 0.0009**		
Random effects:	Crop type	Barley	-0.0003 ± 0.001	0.23$_{(1,30)}$	0.638
Spatial block = 0		Ryegrass	0		
Residual variance = 1.39 E-6	Soil texture	SZL	0.0006 ± 0.0007	0.54$_{(2,30)}$	0.590
		CL	-0.0001 ± 0.001		
		SC	0		
	Acari		-0.0027 ± 0.0044	1.62$_{(1,52)}$	0.213
	Nematoda		-0.0001 ± 0.0001	2.85$_{(1,30)}$	0.102
	Acari × soil texture	**SZL**	**0.018 ± 0.005**	**12.21$_{(2,30)}$**	**0.0001**
		CL	**-0.001 ± 0.006**		
		SC	**0**		
	Nematoda × crop type	Barley	**0.001 ± 0.001**	**7.48$_{(1,30)}$**	**0.010**
		Ryegrass	**0**		
	Fungi:bacteria			0.27$_{(1,29)}$	0.608
	Biochar			0.10$_{(1,29)}$	0.755
	Collembola			2.13$_{(1,29)}$	0.155
	Soil moisture			0.13$_{(1,30)}$	0.722
	Soil nitrogen content			0.02$_{(1,30)}$	0.891
	Soil pH			0.01$_{(1,29)}$	0.911

Table 6S. All tests from a linear mixed model (LMM) of the response of net ecosystem exchange and ecosystem respiration to treatments, covariates and their interactions. Net CO_2 efflux data were expressed as positive values whereas net CO_2 uptake data were expressed as negative values. Values are estimates of fixed effects and type III (adjusted for other significant terms) F & p statistics α =0.05. Repeated measures at the mesocosm level accounted for with an AR(1) autoregressive structure. × = interaction. Biochar (+) vs Control (−); SZL: sandy silt loam, CL: clay loam, SC: sandy clay; Collembola, Acari or Nematoda = density of these soil invertebrates. Bold text indicates significant terms retained in final LMM α =0.05, interactions only reported where significant or marginally (i.e. p = 0.05) non-significant.

Response	Fixed effect	Class	Estimate	$F_{(ndf, ddf)}$	p
Net ecosystem exchange	**Intercept**		**0.304 ± 0.274**		
Random effects:	**Crop type**	**Barley**	**-1.314 ± 0.377**	**6.07$_{(2,299)}$**	**0.003**
Spatial block = 0.00003		**Ryegrass**	**-0.469 ± 0.364**		
Mesocosm AR(1) = -0.091		**Unvegetated**	**0**		
Residual variance = 0.069	Sin(Julian day)		-0.010 ± 0.025	0.08$_{(1,357)}$	0.779
	Cos(Julian day)		**0.083 ± 0.021**	**308.39$_{(1,378)}$**	**<0.0001**
	Plant biomass		**0.010 ± 0.003**	**7.92$_{(1,316)}$**	**0.005**
	Year	**2011**	**-0.282 ± 0.031**	**41.95$_{(2,323)}$**	**<0.0001**
		2012	**-0.033 ± 0.039**		
		2013	**0**		
	Soil texture	**SZL**	**0.033 ± 0.023**	**7.48$_{(2,256)}$**	**0.001**
		CL	**0.088 ±0.023**		
		SC	**0**		
	Nematoda		**0.007 ± 0.002**	**8.08$_{(1,145)}$**	**0.005**
	Soil pH		-0.031 ± 0.044	0.06$_{(1,278)}$	0.803
	Soil N content		-0.719 ± 0.363	0.71$_{(1,254)}$	0.399
	Sin(Julian day) × crop type	**Barley**	**0.090 ± 0.027**	**6.16$_{(2,357)}$**	**0.002**
		Ryegrass	**0.022 ± 0.026**		
		Unvegetated	**0**		
	Cos(Julian day) × crop type	**Barley**	**0.178 ± 0.023**	**61.59$_{(2,376)}$**	**<0.0001**
		Ryegrass	**0.246 ± 0.023**		
		Unvegetated	**0**		
	Sin(Julian day) × soil type	SZL	-0.026 ± 0.026	1.49$_{(2,340)}$	0.226
		CL	-0.045 ± 0.026		
		SC	0		
	Cos(Julian day) × soil texture	**SZL**	**-0.080 ± 0.023**	**10.37$_{(2,380)}$**	**<0.0001**
		CL	**-0.097 ± 0.023**		
		SC	**0**		
	Soil pH× crop type	**Barley**	**0.133 ± 0.061**	**3.27$_{(2,290)}$**	**0.039**
		Ryegrass	**-0.017 ± 0.059**		
		Unvegetated	**0**		
	Soil N content × crop type	**Barley**	**1.697 ± 0.269**	**21.05$_{(2,338)}$**	**<0.0001**
		Ryegrass	**1.260 ± 0.282**		
		Unvegetated	**0**		
	Biochar			0.037$_{(1,261)}$	0.544
	Collembola			0.10$_{(1,228)}$	0.748
	Acari			0.10$_{(1,200)}$	0.757
	Fungi:bacteria			0.99$_{(1,216)}$	0.321
	Soil moisture			0.06$_{(1,284)}$	0.807
Ecosystem respiration					
Random effects:	**Intercept**		**0.044 ± 0.007**		
Spatial block = 0	**Crop type**	**Barley**	**-0.007 ± 0.007**	**17.87$_{(2,185)}$**	**<0.0001**
Mesocosm AR(1) = -0.25		**Ryegrass**	**-0.050 ± 0.008**		
Residual variance = 0.013		**Unvegetated**	**0**		
	Sin(Julian day)		**-0.034 ± 0.004**	**57.09$_{(1,233)}$**	**<0.0001**
	Cos(Julian day)		**-0.008 ± 0.004**	**5.24$_{(1,244)}$**	**0.023**
	Plant biomass		**0.004 ± 0.001**	**25.09$_{(1,208)}$**	**<0.0001**

Year	**2011**	**-0.106 ± 0.011**	**$55.76_{(2,274)}$**	**<0.0001**
	2012	**-0.055 ± 0.006**		
	2013	**0**		
Nematoda		**0.002 ± 0.001**	**$6.38_{(1,200)}$**	**0.0123**
Plant biomass × crop type	**Barley**	**-0.004 ± 0.001**	**$22.49_{(1,207)}$**	**<0.0001**
	Ryegrass	**0**		
	Unvegetated	**0**		
Biochar			$0.84_{(1,180)}$	0.362
Soil texture			$1.21_{(2,180)}$	0.302
Acari			$0.01_{(1,174)}$	0.916
Collembola			$0.85_{(1,179)}$	0.357
Fungi:bacteria			$0.01_{(1,175)}$	0.939
Soil pH			$0.15_{(1,215)}$	0.702
Soil N content			$0.16_{(1,179)}$	0.687
Soil moisture			$1.25_{(1,195)}$	0.264

Table 7S. Raw values of soil fauna density, averaged across 72 mesocosms (mean ± S.E.). Biochar (+) vs Control (−); SC: sandy clay; SZL: sandy silt loam, CL: clay loam.

	Nematoda (individuals g^{-1} soil)	**Collembola (individuals g^{-1} soil)**	**Acari (individuals g^{-1} soil)**
Biochar			
+	2.20 ± 0.22	0.20 ± 0.02	0.14 ± 0.02
-	2.64 ± 0.29	0.16 ± 0.02	0.13 ± 0.02
Crop type			
Barley	1.83 ± 0.22	0.15 ± 0.02	0.12 ± 0.02
Ryegrass	3.47 ± 0.37	0.27 ± 0.02	0.14 ± 0.02
Unvegetated	2.03 ± 0.34	0.13 ± 0.03	0.15 ± 0.02
Soil texture			
SC	3.39 ± 0.45	0.14 ± 0.02	0.11 ± 0.01
SZL	2.69 ± 0.35	0.21 ± 0.03	0.18 ± 0.03
CL	1.16 ± 0.09	0.20 ± 0.03	0.11 ± 0.02

Table 8S. Raw values of above- and belowground biomass, averaged across 72 mesocosms (mean ± S.E.). Biochar (+) vs Control (−); SC: sandy clay; SZL: sandy silt loam, CL: clay loam.

	Aboveground biomass, barley (g^{-1} mesocosm)	**Aboveground biomass, ryegrass (g^{-1} mesocosm)**	**Belowground biomass, barley (mg g^{-1} soil)**	**Belowground biomass, ryegrass (mg g^{-1} soil)**
Biochar				
+	37.44 ± 8.38	8.36 ± 1.11	0.70 ± 0.14	3.30 ± 0.60
-	34.48 ± 7.08	7.80 ± 1.21	0.82 ± 0.40	3.40 ± 1.03
Soil texture				
SC	64.62 ± 10.14	12.73 ± 1.40	1.40 ± 0.45	4.61 ± 1.33
SZL	21.82 ± 2.40	5.16 ± 3.51	0.24 ± 0.16	2.48 ± 0.73
CL	24.45 ± 7.07	6.10 ± 1.17	0.68 ± 0.18	2.67 ± 0.56

Table 9S. Raw values of PLFA concentrations, averaged across 72 mesocosms (mean ± S.E.). Biochar (+) vs Control (−); SC: sandy clay; SZL: sandy silt loam, CL: clay loam.

	Total PLFA (nmol g^{-1} soil)	**Fungal to Bacterial Ratio**	**AMF Fungal PLFA (nmol g^{-1} soil)**
Biochar			
+	39887 ± 1963	0.51 ± 0.04	1410 ± 84.7
-	38854 ± 1604	0.50 ± 0.04	1252 ± 68.6
Crop type			
Barley	35436 ± 1193	0.42 ± 0.03	1194 ± 51
Ryegrass	51158 ± 1504	0.69 ± 0.06	1878 ± 59
Unvegetated	31518 ± 1273	0.41 ± 0.03	921 ± 28
Soil texture			
SC	43763 ± 1884	0.43 ± 0.03	1409 ± 90
SZL	38930 ± 2659	0.57 ± 0.06	1214 ± 98
CL	35419 ± 1599	0.52 ± 0.04	1370 ± 97