

Supporting information

Table S1. Four HHV for broom, gorse and the respective biochars. Means with the same letter are not significantly different ($p>0.05$) using Duncan test for broom and gorse independently (lowercase letter). The capital letters represents the difference between the HHV calculated for each sample.

	HHV ₁			HHV ₂			HHV ₃			HHV ₄		
BROOM	16.15±0.07a	B		14.89±0.44a	A		16.81±0.26a	C		14.42±0.31a	A	
BB300-1H	22.99±1.14b,c	A		23.01±1.02d,e	A		23.86±1.01b,c	A		22.39±1.11b,c	A	
BB300-3H	24±1.14c	A		24.17±1.05e	A		24.91±1.01c	A		23.63±1.09c	A	
BB600-1H	22.8±0.76b,c	A,B		22.09±0.42c,d	A		23.35±0.44b,c	B		22.24±0.42b,c	A	
BB600-3H	21.68±1.56b	A		21.16±1.27c	A		22.52±1.22b	A		21.42±1.27b	A	
GORSE	17.58±0.83a	B,C		16.57±0.4b	A,B		18.14±0.75a	C		15.78±0.82a	A	
BG300-1H	22.83±0.79b,c	A		22.59±0.62c,d,e	A		23.55±0.73b,c	A		21.95±0.83b,c	A	
BG300-3H	24.09±0.6c	A,B		24.11±0.43e	A,B		24.98±0.51c	B		23.67±0.57c	A	
BG600-1H	23.85±1.25c	A		22.9±1.58d,e	A		24.34±1.43c	A		23.34±1.6c	A	
BG600-3H	24.11±1.04c	A		22.94±1.07d,e	A		24.41±1c	A		23.39±1.11c	A	

$$HHV_1 (MJ Kg^{-1}) = 0.3491*\%C + 1.1783*\%H + 0.1005*\%S - 0.1034*\%O - 0.015*\%N - 0.021*\%Ash.$$

$$HHV_2 (MJ Kg^{-1}) = 32.9C + 162.7H - 16.2O - 954.4S + 1.408$$

$$HHV_3 (MJ Kg^{-1}) = (0.3383*\%C) + (1.422*\%H) - (\%O/8).$$

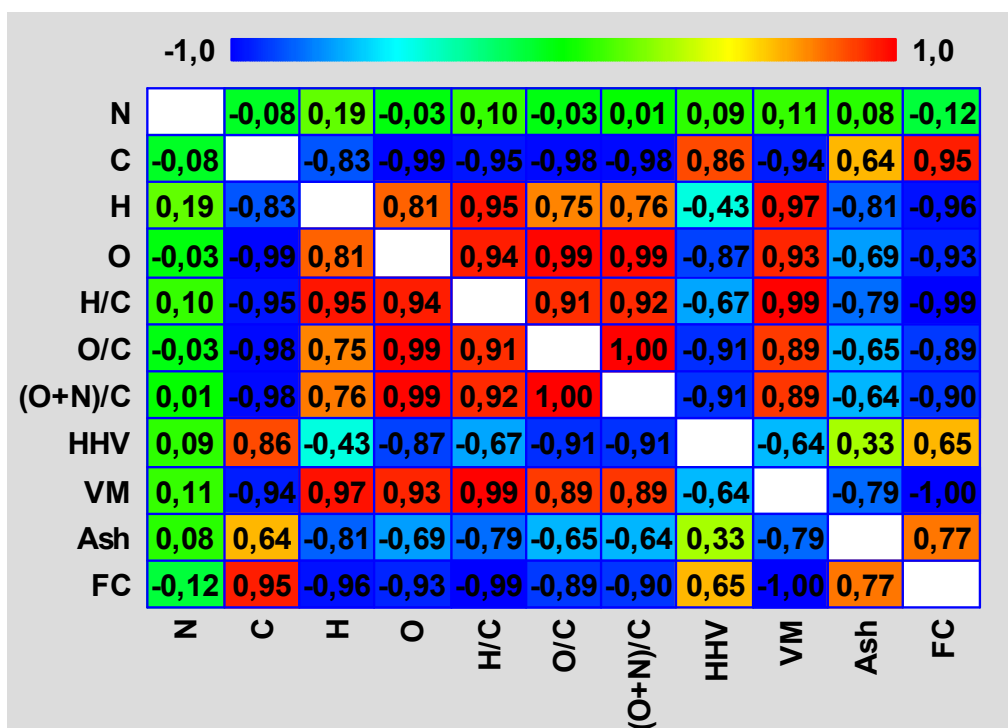
$$HHV_4 (MJ Kg^{-1}) = 0.3383*\%C + 1.443(\%H - (\%O/8)) + (0.0942*\%S)$$

Table S2. PAHs (ng g⁻¹) for broom and gorse and the respective biochars.

PAHs (ng g ⁻¹)	BB300-1H	BB300-3H	BB600-1H	BB600-3H	BG300-1H	BG300-3H	BG600-1H	BG600-3H
Naphthalene	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Acenaphthylene	0.035	0.027	n.d.	n.d.	0.016	n.d.	n.d.	0.075
Acenaphthene	0.95	1.45	0.75	0.56	1.41	1.06	0.47	0.73
Fluorene	1.42	1.95	0.94	0.51	1.77	0.97	0.70	0.99
PAH light	2.41	3.43	1.68	1.07	3.19	2.03	1.18	1.80
Phenanthrene	12.79	24.07	9.13	8.77	16.24	12.55	11.19	17.30
Anthracene	0.52	0.84	0.33	0.18	0.63	0.39	0.26	0.42
Fluoranthene	4.81	8.27	2.55	2.20	4.91	4.16	2.38	3.20
PAH medium	18.11	33.18	12.02	11.15	21.79	17.10	13.83	20.92
Pyrene	6.66	7.89	2.33	1.98	4.41	3.75	2.81	4.00
Benz[a]anthracene	1.15	5.01	1.59	1.21	2.99	2.28	0.57	2.55
Chrysene	0.37	6.31	0.67	0.14	1.26	0.26	0.18	5.24
Benzo(b+j)fluoranthene	0.78	1.37	6.92	0.34	13.16	0.65	0.39	0.70
Benzo[k]fluoranthene	1.15	2.11	5.81	2.34	10.98	4.42	0.57	1.59
Benzo[a]pyrene	1.17	3.96	1.79	0.70	3.37	1.32	0.58	1.01
Dibenzo[a,h]anthracene	3.07	1.94	3.84	2.30	25.01	22.23	1.52	0.99
Benzo[g,h,i]perylene	4.71	0.21	4.34	4.59	8.19	8.66	2.31	0.16
Indeno[1,2,3-cd]pyrene	3.61	0.53	3.39	3.80	6.40	5.17	2.27	0.20
PAH heavy	22.67	29.34	30.68	17.40	75.77	48.73	11.19	16.43
PAH Total	43.19	65.95	44.38	29.62	100.75	67.86	26.20	39.15

n.d.= no detected. The limit has been defined below 0.01 ng g⁻¹.

Table S3. Correlation matrix for elemental analysis parameters (N, C, H, O, H/C, O/C, (O+N)/C, H), HHV, and proximate analysis parameters (VM, FC and ash content).



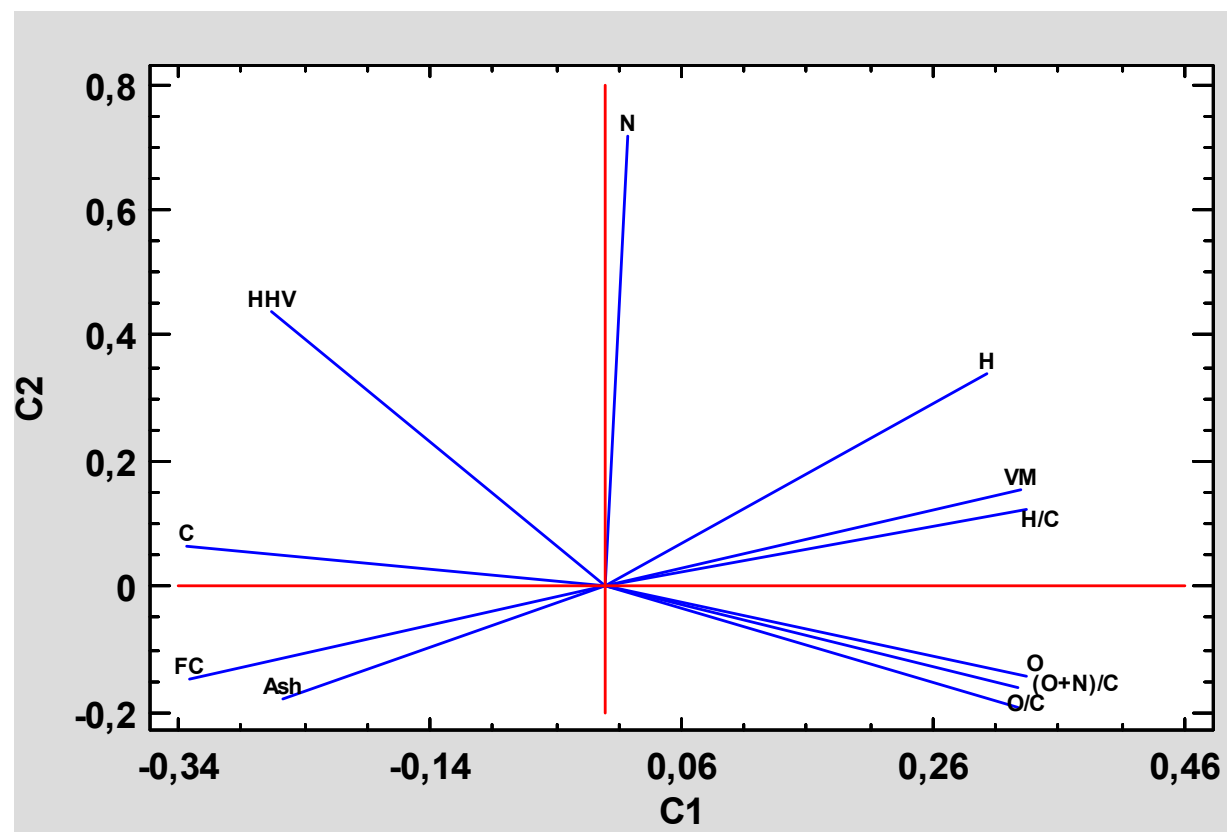


Figure S1. PCA loading plots for elemental analysis parameters (N, C, H, O, H/C, O/C, (O+N)/C), HHV, and proximate analysis parameters (VM, FC and ash content).

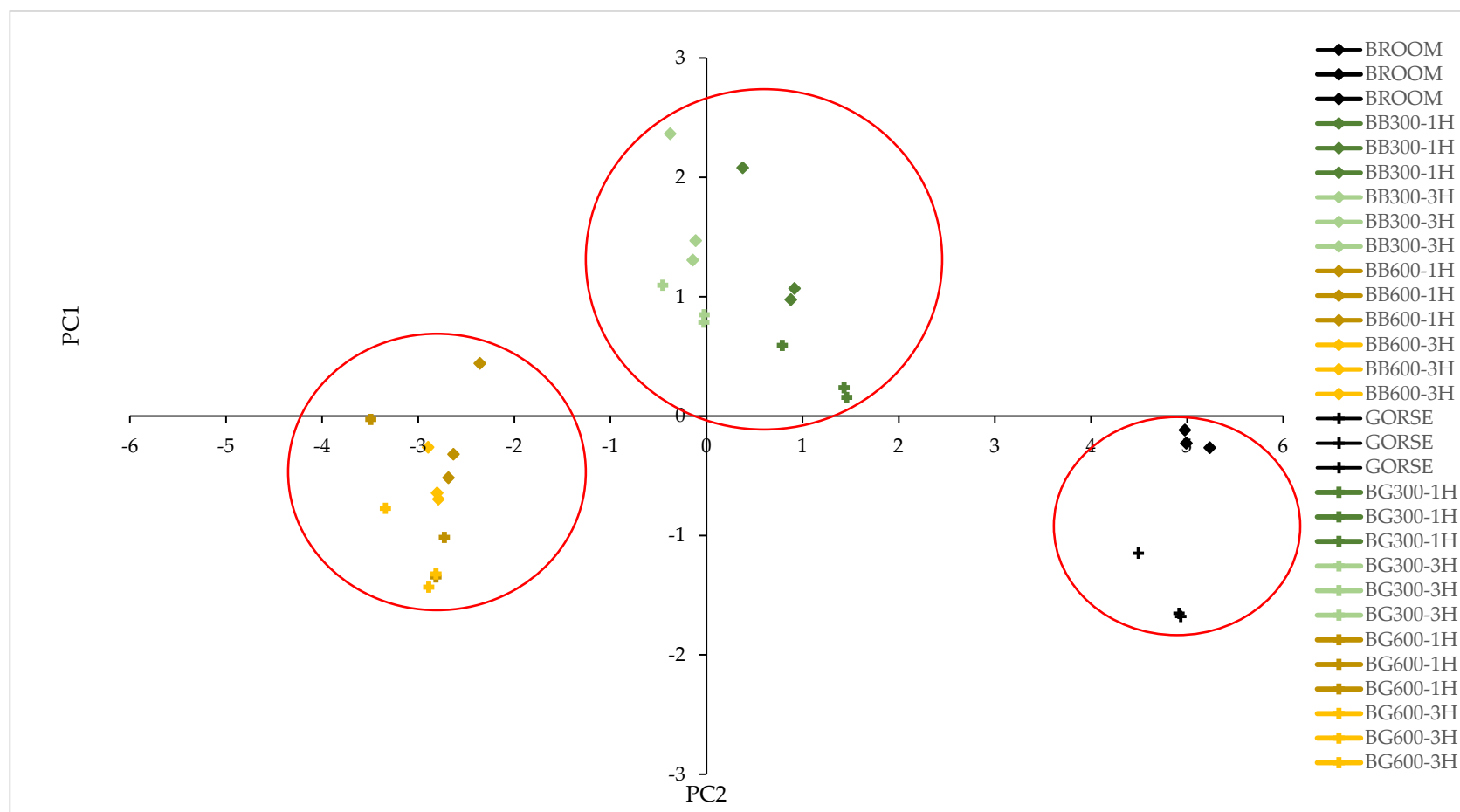


Figure S2. PC1 versus PC2 score-score plot showing the distributions for broom and gorse and the respective biochars.