

Table S1 Chemical and physical properties of alkali-enhanced rice straw biochars prepared at different pyrolysis temperature

Sample	RS	Pyrolysis temperature	0B	5KB	10KB	5K2B	10K2B	5CB	10CB
pH	6.19	350°C	6.65	6.91	8.72	9.12	9.36	7.85	8.32
		450°C	8.89	9.27	9.67	9.86	10.20	8.15	8.75
		550°C	9.59	10.22	10.51	10.14	10.24	8.96	9.61
Ash%	17	350°C	31.8	32.39	35.57	37.28	38.58	35.91	43.86
		450°C	39.54	37.53	40.61	44.88	46.35	40.42	44.48
		550°C	45.12	52.69	57.93	49.7	50.27	47.88	52.26
C%	38.82	350°C	43.76	46.54	42.45	43.16	42.40	48.09	42.18
		450°C	44.13	46.26	44.87	41.93	40.05	45.59	42.49
		550°C	45.03	41.26	34.21	43.69	40.06	28.88	24.74
N%	1.12	350°C	1.31	1.28	1.15	1.14	1.00	1.41	0.92
		450°C	1.32	1.06	1.21	0.76	1.02	1.53	0.91
		550°C	2.19	1.23	1.00	0.96	0.97	1.03	0.98
P g kg ⁻¹	0.9	350°C	1.31	0.96	1.07	1.15	0.81	1.29	0.80
		450°C	1.45	1.65	1.05	1.14	1.62	1.40	1.20
		550°C	1.84	1.80	1.75	1.95	1.56	1.65	1.34
K g kg ⁻¹	11.72	350°C	14.56	64.67	92.22	64.18	109.68	10.14	8.46
		450°C	17.58	69.07	103.66	106.27	140.73	12.88	12.42
		550°C	16.09	86.02	138.46	89.71	137.74	14.56	14.36
Ca g kg ⁻¹	1.9	350°C	3.27	2.27	2.44	4.02	1.62	59.95	80.91
		450°C	4.59	3.50	3.87	3.42	1.69	49.16	105.51
		550°C	4.45	4.47	4.39	2.66	2.37	67.4	117.24
Mg g kg ⁻¹	1.75	350°C	0.59	0.43	0.56	0.6	0.27	1.41	1.72
		450°C	0.60	0.82	0.69	0.68	0.32	2.06	2.09
		550°C	3.15	3.09	3.09	1.11	0.28	2.85	2.7
Zn g kg ⁻¹	0.06	350°C	0.09	0.09	0.14	0.06	0.09	0.18	0.21
		450°C	0.18	0.09	0.15	0.1	0.14	0.19	0.26
		550°C	0.11	0.12	0.24	0.09	0.09	0.61	0.49

Note: RS, rice straw; 0KB, 5KB/K2B/CB, 10KB/K2B/CB indicate the biochars prepared at the proportion of KOH/K₂CO₃/CaO to feedstock of 0:100, 5:100, 10:100. 350, 450, 550°C indicate pyrolysis temperature.

Table S2 Chemical and physical properties of alkali-enhanced rice husk biochars prepared at different pyrolysis temperature

Sample	RH	Pyrolysis temperature	0B	5KB	10KB	5K2B	10K2B	5CB	10CB
pH	6.23	350°C	6.46	6.89	7.78	8.41	8.9	7.27	9.44
		450°C	7.99	9.3	9.74	9.9	10.01	8.8	9.52
		550°C	8.58	9.95	10.08	10.01	10.24	9.41	9.65
Ash%	19.39	350°C	33.55	34.57	34.8	36.8	38.66	38.03	40.47
		450°C	39.36	41	43.87	43.12	46.23	42.58	49.81
		550°C	44.36	46.07	47.7	47.77	48.14	50.35	54.91
C%	36.97	350°C	41.08	38.97	35.85	40.57	39.47	38.16	38.79
		450°C	43.25	39.42	35.18	41.19	39.98	40.68	37.27
		550°C	44.85	41.28	35.08	41.61	41.51	41.62	32.66
N%	0.59	350°C	0.8	0.84	0.63	0.94	0.77	0.48	0.73
		450°C	0.99	0.49	0.62	0.67	0.63	0.61	0.51
		550°C	0.71	0.67	0.49	0.7	0.6	0.48	0.33
P g kg ⁻¹	0.21	350°C	0.91	0.87	2.33	3.37	0.84	1.56	3.05
		450°C	1.15	0.78	0.68	0.82	1.06	0.83	0.63
		550°C	0.68	2.28	1.59	0.82	0.88	4	2.12
K g kg ⁻¹	1.61	350°C	3.18	42.76	65.34	40.14	70.73	2.99	2.32
		450°C	3.75	53.87	96.31	64.28	92.38	3.28	3.19
		550°C	4.99	64.25	106.21	64.51	99.16	4.72	4.06
Ca g kg ⁻¹	0.91	350°C	1.21	0.88	0.89	0.88	0.79	45.06	81.91
		450°C	1.31	1.06	0.88	0.96	0.9	55.37	106.71
		550°C	1.17	1.09	0.95	0.93	0.72	54.74	102.03
Mg g kg ⁻¹	0.16	350°C	0.41	0.14	0.13	0.11	0.05	0.73	0.6
		450°C	0.59	0.25	0.14	0.13	0.07	0.76	0.82
		550°C	0.53	0.21	0.15	0.12	0.03	0.96	0.92
Zn g kg ⁻¹	0.12	350°C	0.31	0.09	0.08	0.03	0.03	0.41	0.28
		450°C	0.36	0.19	0.08	0.05	0.04	0.41	0.36
		550°C	0.35	0.12	0.1	0.05	0.01	0.56	0.43

Note: RH, rice husk; 0KB, 5KB/K2B/CB, 10KB/K2B/CB indicate the biochars prepared at the proportion of KOH/K₂CO₃/CaO to feedstock of 0:100, 5:100, 10:100. 350, 450, 550°C indicate pyrolysis temperature.