Supporting Information

Optimization of granulation process for binder-free biochar-based fertilizer from digestate and its slow release performance

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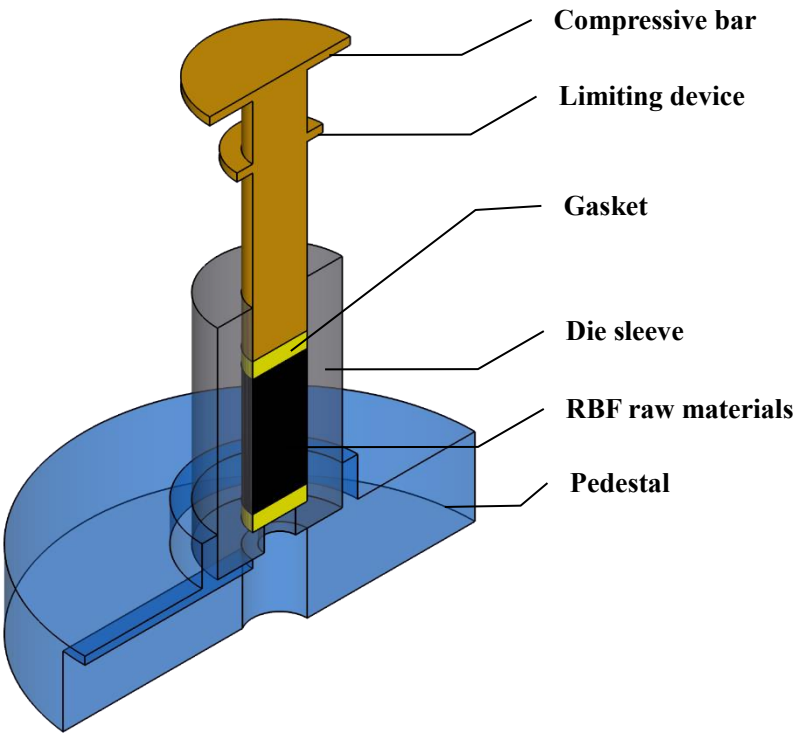

Fig. S1. Piston mold.

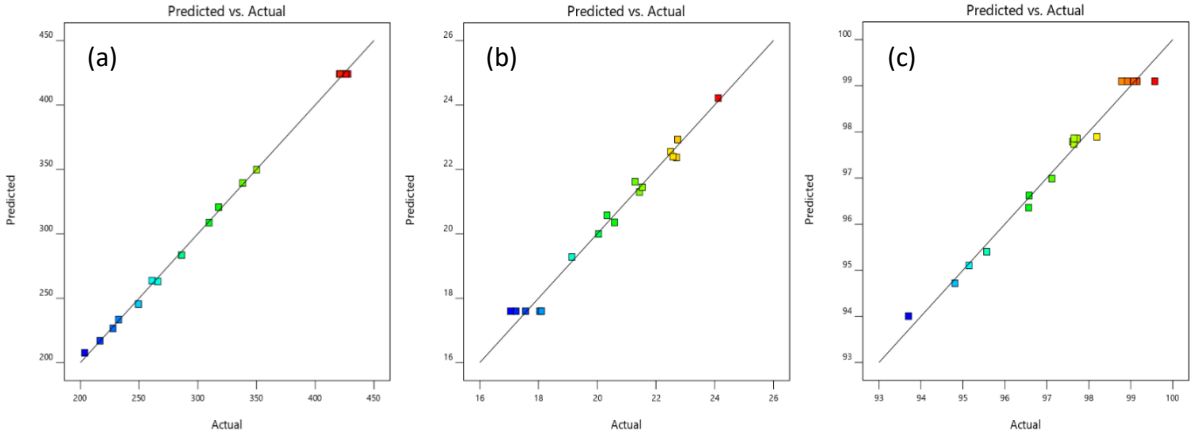

Fig. S2. Relationship between actual and predicted recoveries of (a) compressive strength, (b) ECM, and (c) durability.

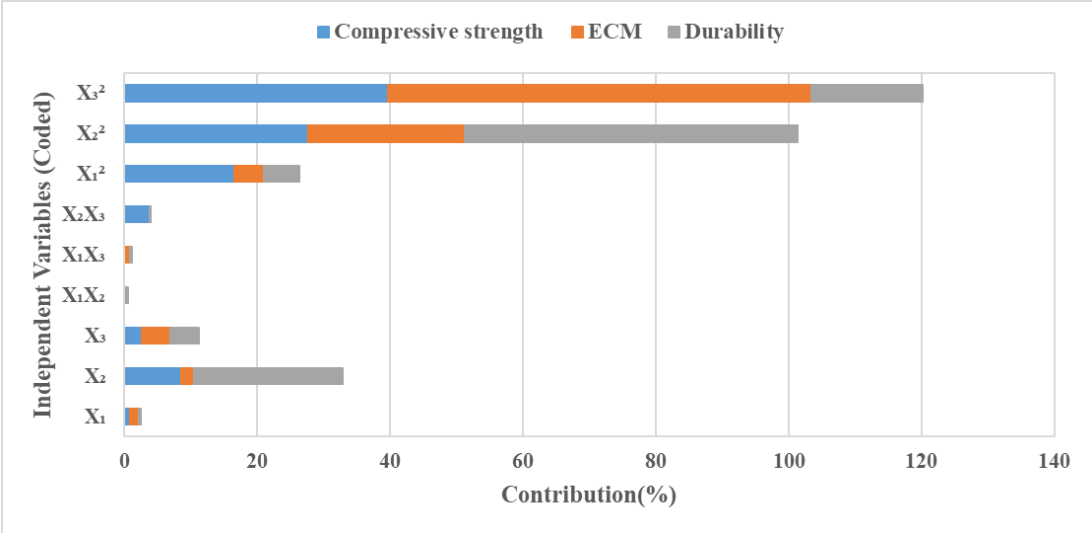

Fig. S3. Graphical Pareto analysis of the effect of significant parameters on selected responses.

Table S1

Experimental design matrix and response of experiments for pelletization optimization.

Run	Operating Parameter			Responses		
	X_1 Compression speed	X_2 Moisture content	X_3 Diameter	Y_1 Compressive strength	Y_2 ECM	Y_3 Durability
	mm/min	%	mm	N	%	%
1	40.00	7.50	8.00	286.23	22.6994	97.7205
2	50.00	5.00	6.00	216.73	21.5373	93.7040
3	60.00	10.00	7.00	338.23	21.4402	97.6459
4	40.00	10.00	7.00	317.70	20.3364	97.6195
5	40.00	7.50	6.00	232.50	20.0449	96.5676
6	50.00	7.50	7.00	424.20	17.5610	99.1504
7	50.00	7.50	7.00	420.73	18.0431	99.0674
8	60.00	7.50	8.00	309.63	22.4997	97.6505
9	50.00	7.50	7.00	427.77	17.2388	98.9094
10	50.00	5.00	8.00	203.73	22.7415	95.1456
11	60.00	5.00	7.00	266.00	20.5896	95.5688
12	60.00	7.50	6.00	260.98	21.2886	97.1217
13	50.00	10.00	6.00	249.47	22.5811	96.5799
14	40.00	5.00	7.00	227.83	19.1386	94.8114
15	50.00	7.50	7.00	421.17	17.0507	99.5751
16	50.00	7.50	7.00	426.03	18.1071	98.7817
17	50.00	10.00	8.00	350.03	24.1210	98.1932

Table S2

BET surface area, pore volume, and average pore size of RB and RBF-T calculated from nitrogen adsorption isotherms at 77 K.

Sample	BET surface area ($m^2 g^{-1}$)	Total pore volume ($cm^3 g^{-1}$)	Average pore size (nm)
		At 0.99 P/P_0[b]	At 0.99 P/P_0[b]
RB	11.025	0.04692	17.02
RBF-25	4.740	0.01626	13.72
RBF-65	8.987	0.02541	11.31
RBF-105	4.716	0.02440	20.70
RBF-145	2.033	0.005914	11.64
RBF-185	4.642	0.02175	18.74