

SUPPLEMENTARY MATERIALS

Table S1. Physical properties for reference extraction samples

	Tobacco waste	Scrap			Dust			Midrib		
	Extraction parameters	Temperature changes	pH changes	Conductivity changes	Temperature changes	pH changes	Conductivity changes	Temperature changes	pH changes	Conductivity changes
C1	1/300 mL/g, 15 min	1.10	0.15	9.01	0.50	0.21	5.47	1.10	-0.02	5.72
C2	1/300 mL/g, 30 min	2.20	0.01	14.02	0.60	0.13	7.89	2.00	0.29	942
C3	1/300 mL/g, 45 min	2.90	0.15	16.08	1.80	0.21	9.69	2.90	0.28	14.47
C4	1/500 mL/g, 15 min	0.80	0.11	8.40	0.60	0.38	7.78	1.50	0.11	3.21
C5	1/500 mL/g, 30 min	1.30	0.14	7.11	0.90	0.22	8.63	1.90	0.14	5.72
C6	1/500 mL/g, 45 min	2.40	0.98	14.87	1.50	0.32	11.25	1.80	0.13	5.42
C7	1/700 mL/g, 15 min	0.70	0.25	21.22	1.20	0.15	8.59	1.90	0.04	5.47
C8	1/700 mL/g, 30 min	0.90	0.47	25.01	1.20	0.37	11.22	2.50	0.33	14.21
C9	1/700 mL/g, 45 min	2.10	0.71	26.00	2.50	0.47	16.5	2.60	-0.09	15.89

Table S2. Analysis of variance (ANOVA) for the response surface quadratic models for physical properties of tobacco waste

Source	Sum of squares	df	Mean square	F-value	p-value
<i>Scrap (Temperature changes)</i>					
Model	340.50	9	37.83	147.17	<0.0001
X ₁	4.81	1	4.81	18.69	0.0035
X ₂	55.65	1	55.65	216.48	<0.0001
X ₃	256.51	1	256.51	997.82	<0.0001
X ₁ ²	3.74	1	3.74	14.55	0.0066
X ₂ ²	11.02	1	11.02	42.85	0.0003
X ₃ ²	1.61	1	1.61	6.25	0.0410
X ₁ X ₂	0.81	1	0.81	3.15	0.1192
X ₁ X ₃	1.00	1	1.00	3.89	0.0892
X ₂ X ₃	3.80	1	3.80	14.79	0.0063
Residual	1.80	7	0.26		
Lack of fit	0.37	3	0.12	0.34	0.7975
Pure error	1.43	4	0.36		
Cor total	342.30	16			
R²=0.9947					
<i>Dust (Temperature changes)</i>					
Model	391.69	9	43.52	10.99	0.0023

X ₁	22.44	1	22.44	5.67	0.0489
X ₂	29.26	1	29.26	7.39	0.0299
X ₃	291.61	1	291.61	73.61	0.0001
X ₁ ²	11.95	1	11.95	3.02	0.3599
X ₂ ²	0.28	1	0.28	0.072	0.1362
X ₃ ²	18.75	1	18.75	4.73	0.9228
X ₁ X ₂	3.80	1	3.80	0.96	0.3599
X ₁ X ₃	11.22	1	11.22	2.83	0.1362
X ₂ X ₃	0.040	1	0.040	0.010	0.9228
Residual	27.73	7	3.96		
Lack of fit	23.38	3	7.79	7.17	0.0436
Pure error	4.35	4	1.09		
Cor total	419.42	16			
R ² =0.9339					
<i>Midrib (Temperature changes)</i>					
Model	313.45	9	34.83	40.36	<0.0001
X ₁	0.55	1	0.55	0.64	0.4504
X ₂	8.41	1	8.41	9.74	0.0168
X ₃	272.61	1	272.61	315.91	<0.0001
X ₁ ²	0.28	1	0.28	0.33	0.5837
X ₂ ²	7.28	1	7.28	8.44	0.0228
X ₃ ²	22.08	1	22.08	25.59	0.0015
X ₁ X ₂	0.30	1	0.30	0.35	0.5724
X ₁ X ₃	0.63	1	0.63	0.42	0.5389
X ₂ X ₃	0.42	1	0.42	0.49	0.5067
Residual	6.04	7	0.86		
Lack of fit	5.19	3	1.73	8.16	0.0352
Pure error	0.85	4	0.21		
Cor total	319.49	16			
R ² =0.9811					
<i>Scrap (Z value)</i>					
Model	0.71	9	0	3.84	0.0450
X ₁	0.36	1	0.78	17.58	0.0041
X ₂	1.268x10 ⁻³	1	0.36	0.062	0.8104
X ₃	0.027	1	1.268x10 ⁻³	1.33	0.2864
X ₁ ²	0.17	1	0.17	8.40	0.0230
X ₂ ²	0.035	1	0.035	1.70	0.2335
X ₃ ²	0.034	1	0.034	1.66	0.2385
X ₁ X ₂	3.28	1	3.28x10 ⁻³	0.16	0.7006
X ₁ X ₃	0.077	1	0.077	3.77	0.0934
X ₂ X ₃	1.192x10 ⁻⁴	1	2.192x10 ⁻⁴	0.011	0.9204
Residual	0.14	7	0.020		
Lack of fit	0.14	3	0.046	51.81	0.0012
Pure error	3.587x10 ⁻³	4	8.967x10 ⁻⁴		
Cor total	0.85	16			
R ² =0.8315					
<i>Dust (Z value)</i>					
Model	0.47	9	0.052	3.72	0.0485
X ₁	0.11	1	0.11	8.15	0.0245
X ₂	3.77x10 ⁻⁵	1	3.777x10 ⁻³	0	0.6184
X ₃	0.077	1	0.077	0.27	0.0513

X ₁ ²	5.833x10 ⁻⁶	1	5.833x10 ⁻⁶	5.51	0.9842
X ₂ ²	0.15	1	0.15	4.193x10 ⁻⁴	0.0139
X ₃ ²	2.859x10 ⁻³	1	2.859x10 ⁻³	10.61	0.6640
X ₁ X ₂	1.151x10 ⁻⁵	1	1.151x10 ⁻⁵	0.21	0.9779
X ₁ X ₃	0.12	1	0.12	8.277x10 ⁻⁴	0.0218
X ₂ X ₃	3.311x10 ⁻³	1	3.311x10 ⁻³	8.62	0.6406
Residual	0.097	7	0.014		
Lack of fit	0.089	3	0.030	14.56	0.0128
Pure error	8.168x10 ⁻³	4	2.042x10 ⁻³		
Cor total	0.56	16			
R²=0.8272					
<i>Midrib (Z value)</i>					
Model	1.03	9	0.11	10.63	0.0026
X ₁	0.30	1	0.30	27.57	0.0012
X ₂	0.19	1	0.19	17.59	0.0041
X ₃	0.16	1	0.16	14.41	0.0067
X ₁ ²	0.035	1	0.035	3.23	0.1153
X ₂ ²	0.11	1	0.11	10.04	0.0157
X ₃ ²	0.013	1	0.013	1.16	0.3169
X ₁ X ₂	1.31x10 ⁻⁴	1	1.310x.10 ⁻⁴	0.012	0.9154
X ₁ X ₃	6.384x10 ⁻³	1	6.384x10 ⁻³	0.59	0.4674
X ₂ X ₃	0.21	1	0.21	19.72	0.0030
Residual	0.076	7	0.011		
Lack of fit	0.056	3	0.019	3.87	0.1121
Pure error	0.019	4	4.851x10 ⁻³		
Cor total	1.11	16			
R²=0.9318					

Table S3. Analysis of variance (ANOVA) for the response surface quadratic models for TPC tobacco waste HVED extracts

Source	Sum of squares	df	Mean square	F-value	p-value
<i>Scrap (TPC)</i>					
Model	1049.63	9	116.63	4.64	0.0278
X ₁	808.64	1	808.64	32.15	0.0008
X ₂	43.80	1	43.80	1.74	0.2285
X ₃	33.87	1	33.87	1.35	0.2839
X ₁ ²	0.18	1	0.18	7.131x10 ⁻³	0.9351
X ₂ ²	58.97	1	58.97	2.34	0.1696
X ₃ ²	66.04	1	66.04	2.63	0.1492
X ₁ X ₂	8.54	1	8.54	5.123x10 ⁻³	0.5783
X ₁ X ₃	0.13	1	0.13	0.89	0.9449
X ₂ X ₃	22.50	1	22.50	7.131x10 ⁻³	0.3757

Residual	176.08	7	25.15		
Lack of fit	120.41	3	40.14	2.88	0.1663
Pure error	55.68	4	13.92		
Cor total	1225.71	16			
R ² =0.8563					
<i>Dust (TPC)</i>					
Model	3806.81	9	422.98	10.07	0.0030
X ₁	2581.67	1	2581.67	61.44	0.0001
X ₂	342.68	1	342.68	8.16	0.0245
X ₃	224.83	1	224.83	5.35	0.0539
X ₁ ²	14.75	1	14.75	0.35	0.5721
X ₂ ²	7.06	1	7.06	0.17	0.6941
X ₃ ²	107.43	1	107.43	2.56	0.1538
X ₁ X ₂	313.02	1	313.02	7.45	0.0294
X ₁ X ₃	163.71	1	163.71	3.90	0.0890
X ₂ X ₃	53.40	1	53.40	1.27	0.2967
Residual	294.12	7	42.02		
Lack of fit	73.18	3	24.39	0.44	0.7360
Pure error	220.94	4	55.24		
Cor total	4100.93	16			
R ² =0.9283					
<i>Midrib (TPC)</i>					
Model	598.68	9	66.52	30.84	< 0.0001
X ₁	399.68	1	399.68	185.31	< 0.0001
X ₂	38.17	1	38.17	17.70	0.0040
X ₃	49.87	1	49.87	23.12	0.0019
X ₁ ²	2.89	1	2.89	1.34	0.2850
X ₂ ²	3.19	1	3.19	1.48	0.2635
X ₃ ²	3.24	1	3.24	1.50	0.2603
X ₁ X ₂	39.22	1	39.22	18.19	0.0037
X ₁ X ₃	4.53	1	4.53	2.10	0.1906
X ₂ X ₃	58.19	1	58.19	26.98	0.0013
Residual	15.10	7	2.16		
Lack of fit	8.94	3	2.98	1.93	0.2658
Pure error	6.16	4	1.54		
Cor total	613.78	16			
R ² =0.9811					

Table S4. Analysis of variance (ANOVA) for the response surface quadratic models for CA

Source	Sum of squares	df	Mean square	F-value	p-value
<i>Scrap</i>					
Model	3.87	9	0.43	3.99	0.0408
X ₁	1.39	1	1.39	12.88	0.0089
X ₂	1.74	1	1.74	16.15	0.0051
X ₃	0.036	1	0.036	0.34	0.5789
X ₁ ²	0.22	1	0.22	2.00	0.2000
X ₂ ²	0.0011	1	0.0011	0.010	0.9219

X ₃ ²	0.24	1	0.24	2.23	0.1790
X ₁ X ₂	0.148225	1	0.15	1.38	0.2790
X ₁ X ₃	0.0676	1	0.068	0.63	0.4541
X ₂ X ₃	0	1	0.000	0.000	1.0000
Residual	0.75	7	0.11		
Lack of fit	0.62	3	0.21	6.00	0.0581
Pure error	0.137	4	0.034		
Cor total	4.62	16			
R ² =0.8369					
<i>Dust</i>					
Model	1.28	9	0.1426	14.33	0.001
X ₁	0.0008	1	0.0008	0.0804	0.785
X ₂	0.0018	1	0.0018	0.1809	0.6834
X ₃	0.3120	1	0.3120	31.36	0.0008
X ₁ ²	0.7252	1	0.7252	72.88	<0.0001
X ₂ ²	0.0178	1	0.0178	1.79	0.2230
X ₃ ²	0.1946	1	0.1946	19.56	0.0031
X ₁ X ₂	0.0001	11	0.0001	0.0101	0.9230
X ₁ X ₃	0.0001	1	0.0001	0.0101	0.9230
X ₂ X ₃	0.0025	1	0.0025	0.2513	0.6316
Residual	0.0697	7	0.0100		
Lack of fit	0.0401	3	0.0134	1.80	0.2860
Pure error	0.0296	4	0.0074		
Cor total	1.35	16			
R ² =0.9485					
<i>Midrib</i>					
Model	1.08	9	0.1195	4.57	0.0288
X ₁	0.125	1	0.1250	4.78	0.0650
X ₂	0.320	1	0.3200	12.25	0.0100
X ₃	0.1404	1	0.1404	5.37	0.0535
X ₁ ²	9.47x10 ⁻⁶	1	9.47x10 ⁻⁶	0.0004	0.9853
X ₂ ²	0.0785	1	0.0785	3	0.1268
X ₃ ²	0.0014	1	0.0014	0.0551	0.8211
X ₁ X ₂	0.0961	1	0.0961	3.68	0.0967
X ₁ X ₃	0.0009	1	0.0009	0.0344	0.8580
X ₂ X ₃	0.3136	1	0.3136	12.00	0.0105
Residual	0.1829	7	0.0261		
Lack of fit	0.0753	3	0.0251	0.9318	0.5032
Pure error	0.1077	4	0.0269		
Cor total	1.26	16			
R ² =0.8546					