Table S1 ANOVA table for the quadratic model of GI

Variance Source	Sum of squares	Degrees of freedom	Mean square	F-Value	P-Value	
Model	423.88	9	47.10	141.16	＜0.0001	Significant
X_1	64.98	1	64.98	194.76	＜0.0001	
X_2	13.78	1	13.78	41.31	0.0004	
X_3	141.96	1	141.96	425.49	＜0.0001	
X_1X_2	11.90	1	11.90	35.67	0.0006	
X_1X_3	25.50	1	25.50	76.44	＜0.0001	
X_2X_3	1.96	1	1.96	5.87	0.0458	
X_{12}	149.56	1	149.56	448.28	＜0.0001	
X_{22}	1.34	1	1.34	4.03	0.0847	
X_{32}	18.83	1	18.83	56.45	0.0001	
Residual	2.34	7	0.3336			
Lack of fit	1.51	3	0.5025	2.43	0.2056	Not Significant
Pure error	0.8280	4	0.2070			
Total	426.21	16				

Table S2 ANOVA table for the quadratic model of HS

Variance Source	Sum of squares	Degrees of freedom	Mean square	F-Value	P-Value	
Model	7258.97	9	806.55	48.54	＜0.0001	Significant
X_1	1324.84	1	1324.84	79.73	＜0.0001	
X_2	178.23	1	178.23	10.73	0.0136	
X_3	2091.43	1	2091.43	125.86	＜0.0001	
X_1X_2	505.13	1	505.13	30.40	0.0009	
X_1X_3	306.25	1	306.25	18.43	0.0036	
X_2X_3	1.09	1	1.09	0.0657	0.8050	
X_{12}	2850.15	1	2850.15	171.52	＜0.0001	
X_{22}	2.31	1	2.31	0.1388	0.7205	
X_{32}	11.02	1	11.02	0.6629	0.4423	
Residual	116.32	7	16.62			
Lack of fit	90.62	3	30.21	4.70	0.0845	Not Significant
Pure error	25.70	4	6.42			
Total	7375.29	16				

Table S3 Test results table

Run	adjacent orifice spacing increment/(cm)(X_1)	orifice diameter/(mm)(X_2)	pipe diameter/(mm)(X_3)	GI (%)	HS (g/kg)
1	0.5	2.0	12	82	145.71
2	1.0	2.0	12	88.9	185.27
3	0.5	3.0	12	82.5	146.5
4	1.0	3.0	12	85.3	156.01
5	0.5	2.5	11	88.9	179.31
6	1.0	2.5	11	85.9	175.25
7	0.5	2.5	13	85.0	152.28
8	1.0	2.5	13	97.1	206.19
9	0.75	2.0	11	92.2	210.31
10	0.75	3.0	11	87.1	194.97
11	0.75	2.0	13	94.5	202.59
12	0.75	3.0	13	98.2	212.16
13	0.75	2.5	12	85.5	174.91
14–17	0.75	2.5	12	87.0	174.91

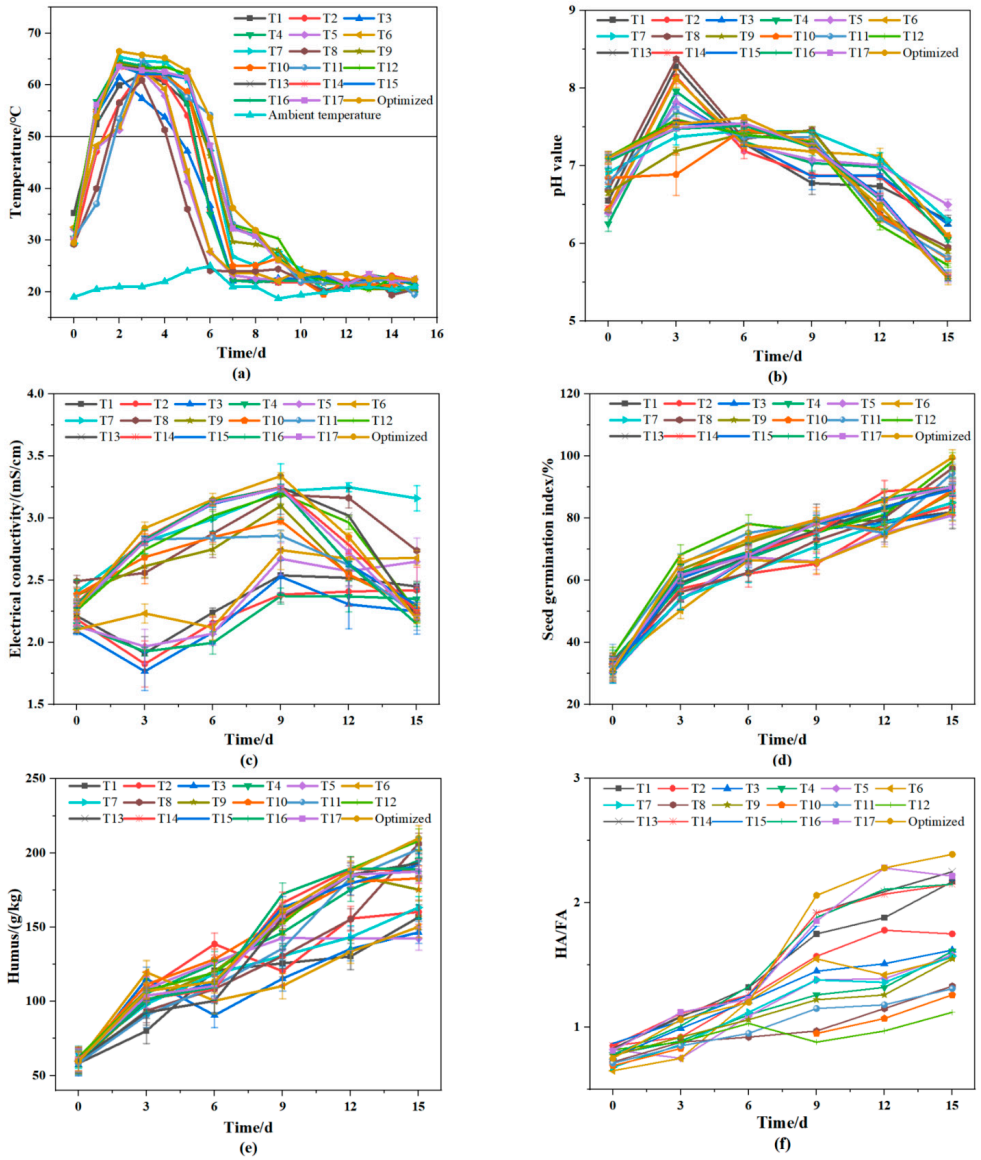


Figure S1 Effects of ventilation pipe design parameters on (a) temperature, (b) pH, (c) EC, (d) GI, (e) HS, and (f) HA/FA during composting