The pH and Phosphorus Availability as Primary Drivers of Compost-Induced CO_2 Emissions from Tropical Soil: Empirical Relationships~~Mechanistic Evidence~~

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~~Text 1 Characterization of Soil Prior to Incubation~~

~~Baseline soil properties were analyzed prior to incubation. Soil pH and EC were measured in a 1:2.5 soil-to-water suspension. Total organic carbon (TOC) was determined by wet oxidation. Available phosphorus (AP) was extracted with 0.5 M $NaHCO_3$ and measured spectrophotometrically. Ammonium (NH_4^+-N) and nitrate (NO_3^--N) were extracted with 2mol/L KCl and analyzed by a continuous flow analyzer. Available potassium (AK) was extracted with 1 M NH_4OAc and quantified via flame atomic absorption spectroscopy (AAS). Cation exchange capacity (CEC) was determined by the ammonium acetate (NH_4OAc) saturation method at pH 7.0.~~

Table S1: Model summary[b]

Model	R	R^2	Adj-R^2	Standard error (S.E.)	Durbin-Watson
1	0.988[a]	0.975	0.902	0.136	1.851

a. predictor variable：(constant), Moisture, AP, pH, EC, OM, AK
b. dependent variable：CO_2 Emission

Table S2: Analysis of Variance (ANOVA)[a].

Model	Sum of square	degree of freedom	Mean square	F	Sig.
Between groups	1.475	6	0.246	13.212	0..072[b]
Within groups	0.037	2	0.019		
Total	1.512	8			

a. predictor variable：(constant), Moisture, AP, pH, EC, OM, AK
b. dependent variable：CO_2 Emission

Table S3: Coefficients.

Model		Unstandardized		Standardized	t	P.	Collinearity statistic	
		B	Std. Error	Beta			Tolerance	VIF[a]
1	(Constant)	-1.561	0.677		-2.304	0.148		
	pH	0.727	0.116	1.331	6.278	0.024	0.274	3.653
	EC	0.123	0.189	1.62	0.651	0.582	0.002	502.874
	Moisture	-0.661	0.14	-1.261	-4.711	0.042	0.172	5.825
	AP	5.815	3.927	1.399	1.481	0.277	0.014	72.539
	AK	-1.584	2.257	-2.144	-0.702	0.556	0.001	758.997
	OM	0.062	0.048	0.332	1.301	0.323	0.189	5.293

a. Variance Inflation Factor

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Table S4: Compact letter display (CLD) of Tukey's HSD post hoc test for each soil physicochemical parameter under different treatments.

Treatment	Moisture	CEC	pH	EC	AP	AK	TOC	TC	OM	NH_4^+-N	NO_3^--N	TN
ARC Soil	f	d	d	g	h	h	e	f	f	d	h	f
FWCS 10%	d	a	d	e	f	f	a	b	b	b	c	b
FWCS 2.5%	ef	c	c	f	g	g	d	e	e	d	e	c
GLCS 10%	c	a	e	d	c	d	a	a	a	a	a	a
GLCS 2.5%	ef	d	c	g	f	f	d	e	e	d	f	e
CDCS 10%	a	c	a	c	b	b	c	d	d	c	d	c
CDCS 2.5%	d	e	b	f	e	e	d	e	e	d	g	e
SLS 10%	b	b	c	a	a	a	b	c	c	b	b	b
SLS 2.5%	de	de	cd	b	d	c	d	e	e	d	e	d

Table footnote: Different lowercase letters within the same column indicate significant differences among treatments according to one-way ANOVA followed by Tukey's HSD post hoc test ($p < 0.05$). Treatments sharing the same letter are not significantly different.

Table S5: One-way ANOVA results for the effects of different treatments on soil physicochemical parameters.

Parameter	F-value	p-value	Significance
Moisture	228.64	<0.001	***
CEC	438.27	<0.001	***
pH	171.52	<0.001	***
EC	596.41	<0.001	***
AP	792.35	<0.001	***

AK	1246.88	<0.001	***
TOC	356.94	<0.001	***
TC	401.22	<0.001	***
OM	487.53	<0.001	***
NH_4^+-N	132.76	<0.001	***
NO_3^--N	364.19	<0.001	***
TN	911.47	<0.001	***

Table footnote: *df (between groups) = 8, df (within groups) = 18 for all parameters. *** indicates p < 0.001.*

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