

**Supplementary information**

**Tables**

**Table. 1 Summary of *P* values from three-way ANOVA analysis of variable parameters in all treatments.**

Parameters	Factors	<i>P</i> value
DO	a	<0.0001
	b	<0.0001
	c	<0.0001
	a × b	<0.0001
	a × c	<0.0001
	b × c	<0.0001
	a × b × c	<0.0001
ORP	a	<0.0001
	b	<0.0001
	c	<0.0001
	a × b	<0.0001
	a × c	<0.0001
	b × c	0.0001
	a × b × c	0.0061
Fe (II) content	a	<0.0001
	b	<0.0001
	c	<0.0001
	a × b	<0.0001
	a × c	<0.0001
	b × c	0.5306
	a × b × c	<0.0001
Fe (III) content	a	<0.0001
	b	<0.0001
	c	<0.0001
	a × b	<0.0001
	a × c	<0.0001
	b × c	0.9236
	a × b × c	<0.0001
CO <sub>2</sub> production	a	<0.0001
	b	<0.0001
	c	<0.0001
	a × b	<0.0001
	a × c	<0.0001
	b × c	<0.0001
	a × b × c	<0.0001
CH <sub>4</sub> production	a	<0.0001
	b	<0.0001
	c	<0.0001
	a × b	<0.0001

	a × c	<0.0001
	b × c	<0.0001
	a × b × c	<0.0001
SOC decomposition	a	<0.0001
	b	<0.0001
	c	<0.0001
	a × b	<0.0001
	a × c	<0.0001
	b × c	<0.0001
	a × b × c	<0.0001
SON mineralization	a	<0.0001
	b	<0.0001
	c	<0.0001
	a × b	0.0015
	a × c	0.0361
	b × c	0.3612
	a × b × c	<0.0001

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The character 'a' represents the different incubation times (0, 1, 3, 5, 7, 10 and 16 days). The character 'b' represents different soil incubation atmosphere (21% O<sub>2</sub> and 0% O<sub>2</sub>); The character 'c' represents Fe (III) addition (with and without Fe (III) addition).

At the 0.05 level,  $P < 0.05$  means the differences between treatments are significant, and  $P > 0.05$  means the differences between treatments are not significant.