

## Supplementary Materials

**Table S1.** Analysis of influences of different fertilizer applications on soil organic carbon fractions, properties of soil and plant, and gas emission based on omega squared ( $\omega^2$ ) from ANOVA model.

Variable	F	<i>p</i>	$\omega^2$
LOIC	9.26	<0.001	0.71
WBC	0.51	0.813	-0.17
POXC	1.07	0.424	0.02
PMC	2.15	0.097	0.25
MBC	7.41	<0.001	0.65
BD	16.08	<0.001	0.81
pH	1.60	0.205	0.15
EC	1.25	0.332	0.07
CEC	1.32	0.303	0.08
Ex. Ca	1.14	0.387	0.04
Ex. K	2.37	0.073	0.28
Ex. Mg	0.27	0.955	-0.27
Av. P <sub>2</sub> O <sub>5</sub>	2.30	0.080	0.27
T-N	3.45	0.019	0.42
FW	4.93	0.004	0.53
Chlorophyll	0.57	0.766	-0.14
Carotenoid	0.65	0.712	-0.11
Plant N	1.51	0.232	0.13
CO <sub>2</sub>	15.51	<0.001	0.81
N <sub>2</sub> O	4.99	0.004	0.54

LOIC, loss-on-ignition carbon; WBC, Walkley-Black carbon; POXC, permanganate oxidizable carbon; PMC, potentially mineralizable C; MBC, microbial biomass carbon; BD, bulk density; EC, electrical conductivity; CEC, cation exchangeable capacity; Ex. Ca, K, and Mg, exchangeable calcium, potassium, and magnesium; Av. P<sub>2</sub>O<sub>5</sub>, available phosphorus; T-N, total nitrogen; FW, fresh weight.

**Table S2.** Relationship of linear regression between soil organic C fractions and variables of soil, plant, GHGs (R-sq: %; \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ , <sup>ns</sup> $p > 0.05$ ). The largest R<sup>2</sup> value in each row is indicated in bold.

Variable	LOIC	WBC	POXC	PMC	MBC
<i>Soil</i>					
BD	<b>16.6*</b>	0.9 <sup>ns</sup>	0.5 <sup>ns</sup>	< 0.1 <sup>ns</sup>	3.2 <sup>ns</sup>
pH	1.5 <sup>ns</sup>	2.4 <sup>ns</sup>	5.6 <sup>ns</sup>	4.8 <sup>ns</sup>	<b>20.0*</b>
T-N	45.5***	29.0**	<b>50.3***</b>	0.2 <sup>ns</sup>	36.0**
Av. P <sub>2</sub> O <sub>5</sub>	<b>22.3*</b>	20.4*	14.5 <sup>ns</sup>	1.6 <sup>ns</sup>	13.3 <sup>ns</sup>
Ex. Ca	9.7 <sup>ns</sup>	3.8 <sup>ns</sup>	25.1*	0.1 <sup>ns</sup>	<b>26.9**</b>
Ex. K	<b>32.9**</b>	12.5 <sup>ns</sup>	8.1 <sup>ns</sup>	6.0 <sup>ns</sup>	2.8 <sup>ns</sup>
Ex. Mg	9.3 <sup>ns</sup>	1.9 <sup>ns</sup>	11.7 <sup>ns</sup>	<b>16.4*</b>	2.3 <sup>ns</sup>
MBC <sup>1</sup>	22.7*	10.8 <sup>ns</sup>	<b>25.9*</b>	< 0.1 <sup>ns</sup>	-
<i>Plant</i>					
FW	<b>60.8***</b>	17.1*	14.0 <sup>ns</sup>	1.0 <sup>ns</sup>	22.4*
N	17.6*	6.2 <sup>ns</sup>	<b>19.3*</b>	11.8 <sup>ns</sup>	5.1 <sup>ns</sup>
<i>GHG</i>					
CO <sub>2</sub>	32.5**	11.3 <sup>ns</sup>	30.4**	0.4 <sup>ns</sup>	<b>49.0***</b>
N <sub>2</sub> O	<b>22.8*</b>	7.0 <sup>ns</sup>	9.2 <sup>ns</sup>	< 0.1 <sup>ns</sup>	12.5 <sup>ns</sup>

<sup>1</sup>Considered as a microbial abundance index. LOIC, loss-on-ignition carbon; WBC, Walkley-Black carbon; POXC, permanganate oxidizable carbon; PMC, po-tentially mineralizable C; MBC, microbial biomass carbon; BD, bulk density; T-N, total nitrogen; Av. P<sub>2</sub>O<sub>5</sub>, available phosphorus; Ex. Ca, K, and Mg, exchangeable calcium, potassium, and magnesium; FW, fresh weight; GHG, greenhouse gas.