



Supplement of

Straw and biochar co-application: a strategy to reduce Cd–Zn bioavailability, alleviate microbial nutrient limitations and enhance soil C stability

Xirui Kang et al.

Correspondence to: Yanhong Lou (yanhonglou1985@163.com) and Yuping Zhuge (zhugeyp@sdau.edu.cn)

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Supplement

Table S1. The elemental composition of corn straw and biochar.

	C (%)	H (%)	N (%)	S (%)	K (%)	P (%)
Corn straw	43.24	7.52	0.87	0.27	1.18	0.52
Biochar	59.13	1.20	1.41	0.40	2.86	0.73

Table S2. Soil alkaline hydrolysable nitrogen (AHN) content of S4C0 treatment on days 30, 60 and 90.

Treatment	Incubation time	AHN (mg kg ⁻¹)
S4C0	Day 30	85.50±2.56a
S4C0	Day 60	70.05±3.92b
S4C0	Day 90	62.56±3.91c

Table S3. β -Glucosidase, urease and alkaline phosphatase activities of S4C0 and S0C4 treatment on days 30, 60 and 90.

Treatment	Incubation time	β -Glucosidase (nmol g ⁻¹ h ⁻¹)	Urease (nmol g ⁻¹ h ⁻¹)	Alkaline phosphatase (nmol g ⁻¹ h ⁻¹)
S4C0	Day 30	98.44±3.19a	69.19±7.20a	61.42±5.20a
S4C0	Day 60	65.16±4.87b	65.35±2.68a	43.14±1.10b
S4C0	Day 90	65.42±3.15b	54.82±2.87b	47.24±3.50b
S0C4	Day 30	67.97±4.72b	39.29±2.45d	33.94±3.19c
S0C4	Day 60	56.02±4.30c	46.68±2.65c	34.27±3.05c
S0C4	Day 90	54.37±3.81c	43.03±2.60cd	34.23±2.77c

Table S4. Vector length and vector angle of different treatments on days 30, 60 and 90.

	Vector length			Vector angle (°)		
	Day 30	Day 60	Day 90	Day 30	Day 60	Day 90
CK	0.97±0.03a	0.88±0.05a	0.85±0.03a	43.02±1.47a	44.75±1.81a	42.16±2.00a
S4C0	0.85±0.04de	0.78±0.02bc	0.80±0.01b	43.64±0.34a	39.70±0.76c	43.13±1.53a
S3C1	0.82±0.00e	0.74±0.01c	0.83±0.01a	43.73±0.46a	40.70±1.58bc	41.11±2.32a
S2C2	0.87±0.04cd	0.80±0.02b	0.80±0.02b	43.07±0.39a	41.92±1.26bc	43.49±1.69a
S1C3	0.90±0.01bc	0.83±0.02b	0.84±0.02a	42.76±0.78a	44.18±1.24ab	42.43±0.26a
S0C4	0.92±0.03b	0.83±0.02b	0.83±0.03ab	43.50±1.34a	41.27±1.55c	42.25±1.61a

Table S5. The principal component analysis (PCA) results.

PCA		PC1	PC2
Components	Eigenvalue	8.386	3.431
	Variance (%)	64.508	26.393
	Cumulative variance (%)	64.508	90.901
	DTPA-Cd	-0.889	0.432
	DTPA-Zn	-0.763	0.536
	CO ₂ accumulation	0.012	0.993
	SOC	0.896	0.369
	AHN	0.947	-0.206
	Olsen-P	0.946	0.297
	AK	0.952	-0.196
	DOC	0.677	0.728
	MAOC	0.715	-0.531
	MBC	0.769	0.324
	MBN	0.970	-0.019
	MBP	0.983	0.026
Vector length		-0.210	-0.867

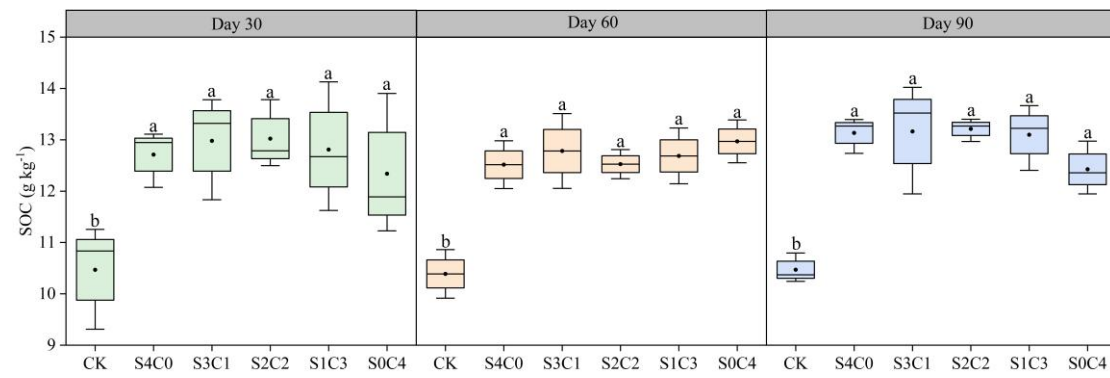


Figure S1. Soil organic carbon (SOC) contents of different treatments on days 30, 60 and 90.

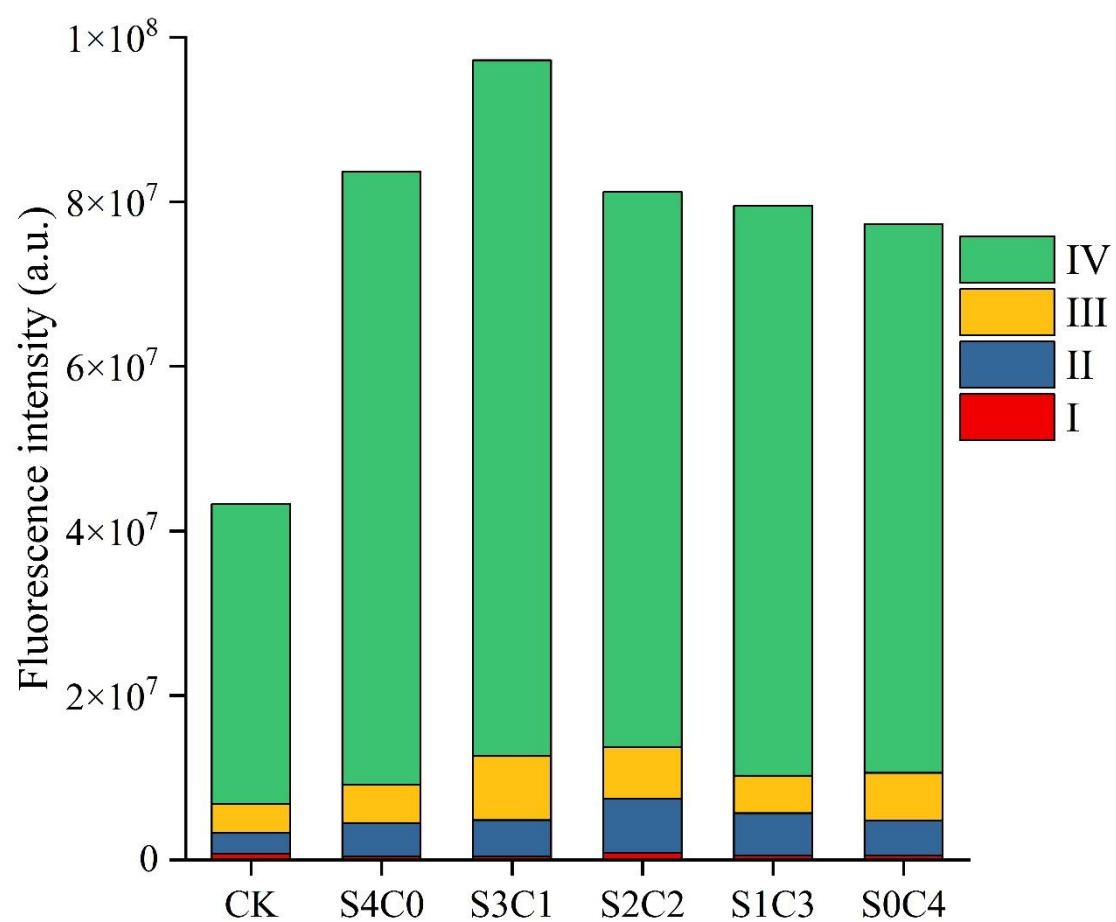


Figure S2. Fluorescence intensity of soil dissolved organic carbon (DOC) components.

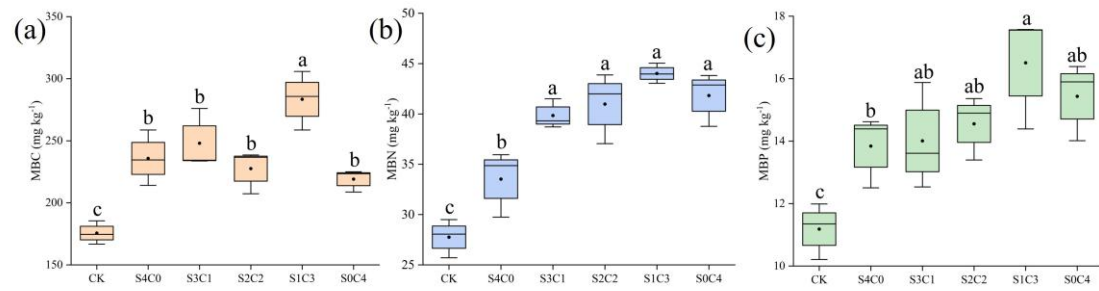


Figure S3. (a) Microbial biomass carbon (MBC), (b) microbial biomass nitrogen (MBN), and (c) microbial biomass phosphorus (MBP) contents of different treatments on day 90.