

Supplementary Materials

Soil microbial community shifts with long-term of different straw return in wheat-corn rotation system

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Table S1 General description of soil properties of different straw return treatment. Different letters indicate significant difference ($P < 0.05$) analyzed by using ANOVA.

Treatment	pH	SOC (g kg ⁻¹)	TN (g kg ⁻¹)	C/N	AN (mg kg ⁻¹)	AK (mg kg ⁻¹)	AP (mg kg ⁻¹)	EC (μs cm ⁻¹)
Blank	8.90 ± 0.12 ^a	8.92 ± 0.62 ^a	0.84 ± 0.01 ^{ab}	10.57 ± 0.83 ^a	25.02 ± 6.69 ^{ab}	129.5 ± 2.12 ^a	3.15 ± 1.65 ^a	215.0 ± 3.4 ^a
CW-0	8.25 ± 0.08 ^b	9.10 ± 0.43 ^a	0.83 ± 0.08 ^a	10.98 ± 1.52 ^{ab}	38.54 ± 4.78 ^c	126.5 ± 0.71 ^a	6.5 ± 0.45 ^b	119.8 ± 5.2 ^b
CW-50%	8.20 ± 0.05 ^b	11.39 ± 0.56 ^b	0.92 ± 0.01 ^c	12.36 ± 0.75 ^a	40.57 ± 1.91 ^c	242.5 ± 6.36 ^b	13.53 ± 0.89 ^c	204.0 ± 6.1 ^a
CW-100%	8.29 ± 0.10 ^b	10.39 ± 0.28 ^c	0.95 ± 0.00 ^c	10.96 ± 0.30 ^b	22.31 ± 2.87 ^a	255.5 ± 3.54 ^c	11.33 ± 0.74 ^d	218.0 ± 1.9 ^a
C-50%	8.31 ± 0.12 ^b	10.28 ± 0.40 ^c	0.92 ± 0.03 ^c	11.14 ± 0.76 ^c	60.86 ± 9.56 ^d	178.0 ± 2.83 ^d	8.47 ± 0.10 ^e	200.0 ± 1.6 ^a
C-100%	8.24 ± 0.08 ^b	6.95 ± 0.10 ^d	0.91 ± 0.01 ^{cd}	7.62 ± 0.21 ^{ad}	27.05 ± 3.83 ^{ae}	194.0 ± 1.41 ^e	9.36 ± 0.10 ^e	200.2 ± 2.5 ^a
W-50%	8.31 ± 0.10 ^b	7.13 ± 0.61 ^d	0.84 ± 0.01 ^a	8.53 ± 0.84 ^a	35.16 ± 19.13 ^{bce}	171.0 ± 1.41 ^f	11.23 ± 0.10 ^d	198.2 ± 1.2 ^a
W-100%	8.20 ± 0.05 ^b	9.00 ± 0.02 ^a	0.88 ± 0.03 ^{bd}	10.28 ± 0.28 ^{bd}	71.00 ± 4.78 ^d	181.5 ± 2.12 ^d	5.92 ± 0.10 ^b	194.4 ± 1.9 ^a

Table S2 The abundance of detected PLFA profiles in all treatments.

Microbial Community	PLFA profile	PLFA amount (nmol g _{soil} ⁻¹)							
		Blank	CW-0	CW-50%	CW-100%	C-50%	C-100%	W-50%	W-100%
Bacterial	15:0 iso	35.10	38.21	42.30	71.18	41.11	73.28	45.97	44.03
	15:0 anteiso	19.55	22.73	24.04	63.74	22.87	51.90	27.24	25.56
	16:0 iso	14.86	16.15	17.83	28.70	17.70	33.13	23.80	18.33
	16:0 anteiso	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	16:1 w9c	0.00	0.00	0.00	0.00	0.00	12.73	0.00	0.00
	16:1 w11c	0.00	0.00	0.00	13.66	8.23	0.00	8.63	0.00
	16:1 w7c/16:1	42.92	45.99	48.98	84.22	41.53	95.52	54.37	86.78
	16:1 w5c	75.02	29.10	26.63	65.12	45.45	71.88	54.15	40.25
	17:1 anteiso	0.00	0.00	0.00	0.00	0.00	0.00	14.39	0.00
	17:0 iso	12.25	14.13	15.35	23.51	14.78	23.26	17.29	17.12
	17:0 anteiso	10.26	12.47	12.26	21.20	14.80	23.82	15.73	14.40
	17:1 w8c	0.00	0.00	3.54	7.71	7.24	12.61	4.17	6.98
	17:0 cyclo	11.03	12.44	14.27	20.19	16.29	31.53	14.65	11.68
	18:1 w7c	54.36	48.34	53.26	103.66	79.77	126.64	68.52	67.87
	18:1 w5c	0.00	0.00	4.76	0.00	0.00	0.00	3.17	15.46
Actinomycetes	19:0 cyclo w8c	27.12	25.03	27.35	47.95	38.21	42.17	38.67	26.20
	16:0 10-methyl	42.28	46.66	43.72	78.66	49.86	70.23	63.96	52.31
	17:0 10-methyl	0.00	5.82	5.47	7.63	7.04	12.54	4.87	3.80
	18:0 10-methyl	10.82	13.65	13.11	17.86	13.04	17.56	15.85	14.33
	19:0 10-methyl	0.00	0.00	0.00	962.92	0.00	0.00	0.00	0.00
Fungal	18:2 w6,9c/18:0	10.33	18.45	24.27	84.94	38.49	72.33	35.20	32.55
	18:1 w9c	43.61	50.45	53.60	160.04	40.62	134.82	76.08	75.79
Others	9:00	2.69	0.00	0.00	0.00	2.60	0.00	0.00	0.00
	10:00	3.13	0.00	1.61	3.86	2.23	0.00	0.00	0.00
	12:00	0.00	5.11	5.37	0.00	5.32	4.96	5.88	0.00
	14:0 iso	0.00	4.42	4.89	8.43	0.00	8.04	5.17	3.88
	14:00	0.00	9.67	14.05	23.77	0.00	10.18	14.82	9.10
	15:1 iso G	0.00	0.00	2.54	0.00	3.68	7.12	0.00	2.38
	15:1 anteiso A	0.00	0.00	0.00	0.00	0.00	3.42	0.00	0.00
	15:00	2.11	2.91	4.99	877.67	2.55	9.87	6.43	5.71
	16:00	96.29	137.58	158.73	230.18	115.92	291.02	174.59	178.12
	17:00	0.00	3.24	18.89	0.00	0.00	11.35	6.16	4.83
	16:1 2OH	0.00	0.00	24.60	26.54	0.00	10.88	16.90	9.33
	16:0 2OH	9.58	0.00	3.27	0.00	11.18	0.00	4.44	5.25
	18:00	27.89	68.86	92.91	96.71	66.16	124.25	91.19	97.73
	18:1 w7c	0.00	0.00	0.89	5.81	0.00	10.47	2.54	6.48
	19:00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00
	20:4	0.00	0.00	0.00	0.00	0.00	9.10	0.00	4.92
	20:00	0.00	8.15	6.83	11.26	0.00	24.98	8.80	11.61
Total		601.19	689.56	820.30	3197.15	756.68	1481.60	973.62	942.81

Table S3 Catabolic profiling obtained with MicroResp™ assay in response to the different treatments.

Carbon source		Substrates induced respiratory rates ($\mu\text{g CO}_2 \text{ g}_{\text{soil}}^{-1} \text{ h}^{-1}$)							
		Blank	CW-0	CW-50%	CW-100%	C-50%	C-100%	W-50%	W-100%
carbohydrates	Water	0.65	2.14	1.46	5.00	0.46	0.86	0.46	0.88
	D-Glucose	0.46	1.38	1.82	4.99	1.56	2.12	1.90	1.84
	L-Arabinose	0.66	1.71	1.85	9.14	0.36	0.38	0.38	0.74
	D-Fructose	1.03	2.94	4.18	4.84	0.89	0.90	1.03	1.43
	D-Galactose	0.49	2.41	2.59	2.91	0.36	0.44	0.32	0.61
	Trehalose	0.53	2.21	2.48	10.72	0.31	0.42	0.41	0.75
Amino acids	L-Alanine	0.40	2.22	2.09	4.21	0.33	0.27	0.25	0.56
	Arginine	4.49	3.34	4.52	10.37	3.27	2.42	3.39	3.89
	L-Cysteine HCl	5.59	3.33	5.76	47.52	5.01	4.07	5.03	5.69
	L-Lysine	0.62	2.35	2.59	4.41	0.43	0.45	0.45	0.45
	NAGA	4.29	3.61	3.82	1.31	3.70	4.35	4.91	5.54
	Citric acid	5.49	2.87	5.15	30.35	3.87	4.88	4.43	5.32
Organic acids	GABA	0.74	3.23	3.16	7.09	0.60	0.60	0.52	0.73
	L-Malic acid	0.01	0.03	0.39	0.94	0.00	0.00	0.00	0.00
	3,4-OHbenzoic acid	0.52	2.64	3.11	6.52	0.46	0.77	0.57	0.74
	Oxalic acid	2.40	3.44	3.85	38.03	1.62	2.62	2.08	2.19