

Crop Conversion from Annual to Perennials: An Effective Strategy to Affect Soil Multifunctionality

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Supplementary Tables S1 to S3

Table S1

Linear mixed-effects model of crop type, soil depth and their interactive effects on soil physical, chemical, and microbial properties.

Data	Treatment	numDF	denDF	F-value	p-value
Soil water content	Intercept	1	21	824.04	< 0.01
	Crop type	3	21	6.01	< 0.01
	Soil depth	1	21	1.54	0.23
	Crop type × Soil depth	3	21	0.92	0.45
Bulk density	Intercept	1	21	3750.62	< 0.01
	Crop type	3	21	5.13	< 0.01
	Soil depth	1	21	11.26	< 0.01
	Crop type × Soil depth	3	21	0.08	0.97
Soil pH	Intercept	1	21	32141.97	< 0.01
	Crop type	3	21	16.45	< 0.01
	Soil depth	1	21	0.01	0.93
	Crop type × Soil depth	3	21	0.28	0.84
Dissolved organic carbon content	Intercept	1	21	560.38	< 0.01
	Crop type	3	21	26.69	< 0.01
	Soil depth	1	21	0.29	0.60
	Crop type × Soil depth	3	21	3.19	0.04
Microbial biomass carbon	Intercept	1	21	719.94	< 0.01
	Crop type	3	21	24.57	< 0.01
	Soil depth	1	21	0.29	0.60
	Crop type × Soil depth	3	21	4.71	0.01
Microbial biomass nitrogen	Intercept	1	21	467.23	< 0.01
	Crop type	3	21	8.02	< 0.01
	Soil depth	1	21	0.25	0.62
	Crop type × Soil depth	3	21	4.55	0.01

numDF, numerator degree of freedom. denDF, denominator degree of freedom. Linear mixed-effects models were conducted, crop type, soil depth and their interaction (crop type × soil depth) were considered as fixed factors, while plots nested within blocks were considered as random factors.

Table S2

Linear mixed-effects model of crop type, soil depth and their interactive effects on soil extracellular enzymatic activities.

Data	Treatment	numDF	denDF	F-value	p-value
Carbon acquisition extracellular enzymatic activities	Intercept	1	21	1627.29	< 0.01
	Crop type	3	21	69.85	< 0.01
	Soil depth	1	21	193.14	< 0.01
	Crop type \times Soil depth	3	21	47.79	< 0.01
Nitrogen acquisition extracellular enzymatic activities	Intercept	1	21	1996.14	< 0.01
	Crop type	3	21	97.99	< 0.01
	Soil depth	1	21	3.62	0.07
	Crop type \times Soil depth	3	21	56.99	< 0.01
Phosphorus acquisition extracellular enzymatic activities	Intercept	1	21	757.58	< 0.01
	Crop type	3	21	72.67	< 0.01
	Soil depth	1	21	559.36	< 0.01
	Crop type \times Soil depth	3	21	52.23	< 0.01

Table S3

Linear mixed-effects model of crop type, soil depth and their interactive effects on soil multifunctionality.

Data	Treatment	numDF	denDF	F-value	p-value
Soil multifunctionality	Intercept	1	21	0.00	1.00
	Crop type	3	21	26.12	< 0.01
	Soil depth	1	21	112.08	< 0.01
	Crop type \times Soil depth	3	21	6.45	< 0.01
Water regulation	Intercept	1	21	0.27	0.61
	Crop type	3	21	0.71	0.56
	Soil depth	1	21	6.86	0.02
	Crop type \times Soil depth	3	21	4.36	0.02
Carbon cycle multifunctionality	Intercept	1	21	0.00	1.00
	Crop type	3	21	165.29	< 0.01
	Soil depth	1	21	458.14	< 0.01
	Crop type \times Soil depth	3	21	104.34	< 0.01
Nitrogen cycle multifunctionality	Intercept	1	21	0.00	1.00
	Crop type	3	21	33.38	< 0.01
	Soil depth	1	21	0.90	0.35
	Crop type \times Soil depth	3	21	18.55	< 0.01
Phosphorus cycle multifunctionality	Intercept	1	21	0.00	1.0000
	Crop type	3	21	64.17	< 0.01
	Soil depth	1	21	493.94	< 0.01
	Crop type \times Soil depth	3	21	46.12	< 0.01