



Table S1. Set of primers selected from previous studies for the quantification of the major groups of microorganisms in the soil (fungi-ITS, bacteria y archaea -16S rRNA).

Target Gene	Primer set name	Sequence (5' to 3')	Length	Reference
Fungal ITS4-ITS5	ITS5R	GGAAGTAAAAGTCGTAACAAGG	651	[94]
	ITS4F	TCCTCCGTCTATTGATATGC		
Bacteria 16S rRNA	341 F	CCTACGGGAGGCAGCAG	174	[95]
	515 R	ATTCCGCGGCTGGCA		
Archaea 16S rRNA	Arc771 F	ACGGTGAGGGATGAAAGCT	220	[96]
	Arc 957 R	CGGCGTTGACTCCAATTG		

Table S2. Soil microbial variables at maize pre-emergence and 57 days after sowing maize.

Water Level	Termination Method	Hyphal Length cm g ⁻¹		Total Bacteria Log10 Copies g ⁻¹		Total Fungi Log10 Copies g ⁻¹		Fungi/Bacteria		Total Archaea Log10 Copies g ⁻¹	
		Pre	57 DAS	Pre	57 DAS	Pre	57 DAS	Pre	57 DAS	Pre	57 DAS
High	CON	22.3 aA	18.9 aA	8.89 bA	9.85 aB	6.40 aA	6.29 aA	0.72 aB	0.63 aA	6.81 aA	7.37 aB
	INC	30.5 aA	33.2 aA	9.62 dA	10.58 bB	6.97cA	7.15 cA	0.72 aB	0.67 bA	7.54 bA	8.53 dB
	GLY	27.7 aA	20.7 aA	7.75 aA	10.34 bB	6.98 cB	6.57 bA	0.90 cB	0.63 aA	7.52 bA	8.48 dB
	RGL	20.9 aA	17.6 aA	8.94 bA	10.47 bB	7.44 dB	6.58 bA	0.83 bB	0.62 aA	7.79 cA	8.07 bB
	ROL	30.0 aA	27.8 aA	9.25 cA	10.01 aB	6.79 bA	7.09 cB	0.73 aA	0.70 cA	7.77 cA	8.30 cB
Low	CON	11.3 xX	17.4 xX	8.31 xX	9.89 xY	6.22 wX	6.35 xX	0.74 xY	0.64 xX	6.74 xX	7.28 xY
	INC	23.0 yX	27.8 xX	9.12 zX	10.24 yY	7.16 yX	7.14 zX	0.78 yY	0.69 yzX	7.54 yX	8.53 zY
	GLY	18.9 xyX	16.7 xX	8.90 yX	9.96 xY	7.09 yX	7.15 zX	0.79 yY	0.71 zX	7.68 yX	7.95 yY
	RGL	18.5 xyX	16.2 xX	9.19 zX	9.89 xY	7.63 zY	6.89 yX	0.83 zY	0.69 yX	7.69 yX	7.95 yY
	ROL	18.2 xyX	20.4 xX	9.21 zX	9.95 xY	6.95 xX	7.05 yzX	0.75 xY	0.70 yzX	7.73 yX	8.48 zY

CON: control, INC: mowing + incorporation, GLY: glyphosate, RGL: glyphosate + roller, ROL: roller crimper; Pre: pre-emergence maize, DAS: days after sowing. For each water level, different lowercase letters indicate significant differences between termination methods, and uppercase letters indicate significant differences between sampling dates (Tukey's HSD test, p-value<0.05).

Table S3. AMF colonization, microbial biomass and variables of microbial activity at 57 days after sowing maize.

Water Level	Termination Method	AMF Colonization	Basal Respiration	Substrate Induced Respiration	Microbial Biomass Carbon	qCO ₂		qMIC
		%	mg C-CO ₂ kg ⁻¹ h ⁻¹	mg C-CO ₂ kg ⁻¹ h ⁻¹	mg kg ⁻¹	mg C-CO ₂	mg MBC h ⁻¹	mg MBC g ⁻¹ C
High	CON	10.0 a	0.63 ab	1.73 a	40.40 a	0.02 b		8.54 a
	INC	28.0 b	0.94 b	1.15 a	88.74 b	0.01 ab		17.46 b
	GLY	20.6 ab	0.64 ab	1.65 a	63.68 ab	0.01 ab		12.51 ab
	RGL	20.0 ab	0.51a	0.92 a	56.84 ab	0.00 a		10.78 ab
	ROL	29.1 b	0.70 ab	1.69 a	81.00 ab	0.01 ab		16.34 ab
Low	CON	11.6 x	0.64 x	1.30 x	44.82 x	0.01 x		9.02 x
	INC	25.2 x	0.58 x	0.70 x	48.87 x	0.01 x		9.47 x
	GLY	11.4 x	0.77 x	1.69 x	66.40 x	0.01 x		13.44 x
	RGL	13.2 x	0.60 x	1.72 x	78.05 x	0.00 x		16.44 x
	ROL	15.2 x	0.82 x	1.38 x	64.83 x	0.01 x		13.33 x

CON: control, INC: mowing + incorporation, GLY: glyphosate, RGL: glyphosate + roller, ROL: roller crimper; AMF: arbuscular mycorrhizal fungi, qCO₂: metabolic quotient, qMIC: microbial quotient. For each water level, different letters indicate significant differences between means (Tukey's HSD test, p-value<0.05).

Table S4. Soil physicochemical variables at 57 days after sowing maize.

Water Level	Termination Method	pH _{1:2.5}	EC _{1:2.5}	TOC	DOC	DOC/TOC	C/N	C/P	N/P	Moisture	T	PR	Db
			$\mu\text{S cm}^{-1}$	g kg^{-1}	mg kg^{-1}	%				%v	$^{\circ}\text{C}$	kg cm^{-2}	g cm^{-3}
High	CON	8.34 a	250 b	4.88 a	57.8 a	1.18 a	10.08 a	0.17 a	0.020 a	7.46 ab	24.6 a	1.76 bc	1.33 a
	INC	8.47 a	189 ab	5.07 a	58.8 a	1.16 a	6.72 a	0.18 a	0.028 ab	6.32 a	23.9 a	2.22 c	1.33 a
	GLY	8.54 a	171 ab	5.13 a	54.7 a	1.07 a	6.84 a	0.24 a	0.036 b	10.27 ab	24.5 a	1.30 ab	1.36 a
	RGL	8.47 a	200 ab	5.25 a	55.8 a	1.07 a	9.06 a	0.18 a	0.021 a	12.20 b	23.1 a	1.12 a	1.35 a
	ROL	8.46 a	139 a	4.99 a	51.7 a	1.04 a	7.18 a	0.19 a	0.027 ab	7.99 ab	23.8 a	1.60 abc	1.36 a
Low	CON	8.35 x	238 y	4.93 x	58.4 x	1.19 x	6.19 x	0.15 x	0.025 x	2.78 x	24.9 x	1.88 x	1.27 x
	INC	8.42 x	187 xy	5.10 x	53.9 x	1.07 x	11.76 x	0.18 x	0.018 x	3.02 x	24.6 x	2.05 x	1.31 x
	GLY	8.35 x	212 xy	5.02 x	54.5 x	1.09 x	7.71 x	0.17 x	0.024 x	3.14 x	25.1 x	1.48 x	1.37 x
	RGL	8.35 x	235 y	4.86 x	53.5 x	1.12 x	7.02 x	0.15 x	0.023 x	3.20 x	24.2 x	1.62 x	1.31 x
	ROL	8.40 x	147 x	5.00 x	56.1 x	1.14 x	6.28 x	0.17 x	0.028 x	3.16 x	24.0 x	1.90 x	1.34 x

CON: control, INC: mowing + incorporation, GLY: glyphosate, RGL: glyphosate + roller, ROL: roller crimper; EC: electrical conductivity at 25°C, TOC: total organic carbon, DOC: dissolved organic carbon, C/N: carbon/nitrogen ratio, C/P: carbon/phosphorus ratio, T: soil temperature, PR: penetration resistance, Db: bulk density. For each water level, different letters indicate significant differences between means (Tukey's HSD test, p-value <0.05).

Table S5. Pearson correlation matrix of soil physicochemical and soil microbial variables.

	AMF col.	Hyphal length	Basal resp.	SIR	MBC	qCO ₂	qMIC	Total bacteria	Total fungi	Fungi/Bacteria	Total archaea
AMF col.		0.37 **	0.05	-0.10	0.33 *	-0.31 *	0.27 *	0.51 ***	0.42 **	0.15	0.53 ***
Hyphal length	0.37 **		0.17	-0.10	0.34 **	-0.23	0.3 *	0.32 *	0.31 **	0.13	0.37 **
Basal resp.	0.05	0.17		0.00	0.31 *	0.34 **	0.32 *	0.00	0.25	0.24	0.16
SIR	-0.10	-0.10	0.00		-0.00	0.24	0.02	-0.26	-0.08	0.05	-0.14
MBC	0.33 *	0.34 **	0.31 *	-0.00		-0.58 ***	0.97 ***	0.22	0.45 ***	0.33 *	0.38 **
qCO ₂	-0.31 *	-0.23	0.34 **	0.24	-0.58 ***		-0.55 ***	-0.27 *	-0.28 *	-0.14	-0.32 *
qMIC	0.27 *	0.3 *	0.32 *	0.02	0.97 ***	-0.55 ***		0.15	0.42 **	0.34 **	0.33 *
Total bacteria	0.51 ***	0.32 *	0.00	-0.26	0.22	-0.27 *	0.15		0.25	-0.27	0.57 ***
Total fungi	0.42 **	0.31 *	0.25	-0.08	0.45 ***	-0.28 *	0.42 **	0.25		0.86 ***	0.72 ***
Fungi/bacteria	0.15	0.13	0.24	0.05	0.33 *	-0.14	0.34 **	-0.27	0.86 ***		0.41 **
Total archaea	0.53 ***	0.37 **	0.16	-0.14	0.38 **	-0.32 *	0.33 *	0.575 ***	0.72 ***	0.41 **	
PR	0.04	0.14	0.31 *	-0.28 *	0.03	0.22	0.05	0.04	0.20	0.17	0.05
Db	0.08	0.10	0.03	-0.10	0.21	-0.27	0.20	0.10	0.11	0.05	0.16
TOC	0.11	0.02	-0.06	0.01	-0.04	0.00	-0.26	0.22	0.08	-0.03	0.13
pH	0.03	0.30 *	0.06	-0.14	0.20	-0.21	0.21	0.39 **	0.11	-0.09	0.37 **
EC	-0.19	-0.22	-0.26	0.02	-0.09	0.01	-0.09	-0.19	-0.36 **	-0.25	-0.53 ***
C/N	0.03	0.15	-0.15	-0.00	-0.03	0.09	-0.08	0.06	0.05	0.02	-0.03
DOC	-0.01	-0.09	0.25	0.19	-0.33 *	0.59 ***	-0.31 *	0.02	-0.17	-0.18	-0.14
C/P	0.35 **	0.19	-0.18	0.06	0.09	-0.26	-0.02	0.37 **	0.07	-0.11	0.31 *
N/P	0.22	-0.05	0.03	0.06	0.031	-0.19	0.00	0.13	-0.00	-0.06	0.22
DOC/TOC	-0.08	-0.08	0.22	0.15	-0.23	0.44 ***	-0.09	-0.11	-0.16	-0.10	-0.17
Moisture	0.26	0.07	-0.26	0.01	-0.01	-0.17	-0.05	0.47 ***	-0.31 *	-0.56 ***	0.07
Temperature	-0.10	0.08	-0.01	0.00	0.01	0.00	-0.01	-0.27 *	-0.03	0.10	-0.16

AMF col.: AMF colonization, Basal resp.: basal respiration, SIR: substrate induced respiration, MBC: microbial biomass carbon, qCO₂: metabolic quotient, qMIC: microbial quotient, PR: penetration resistance, Db: density bulk, TOC: total organic carbon, EC: electrical conductivity at 25°C, C/N: carbon/nitrogen ratio, DOC: dissolved organic carbon, C/P: carbon/phosphorus ratio, N/P: nitrogen/phosphorus ratio. ns: not significant; *, p < 0.05; **, p < 0.01; ***, p < 0.001.

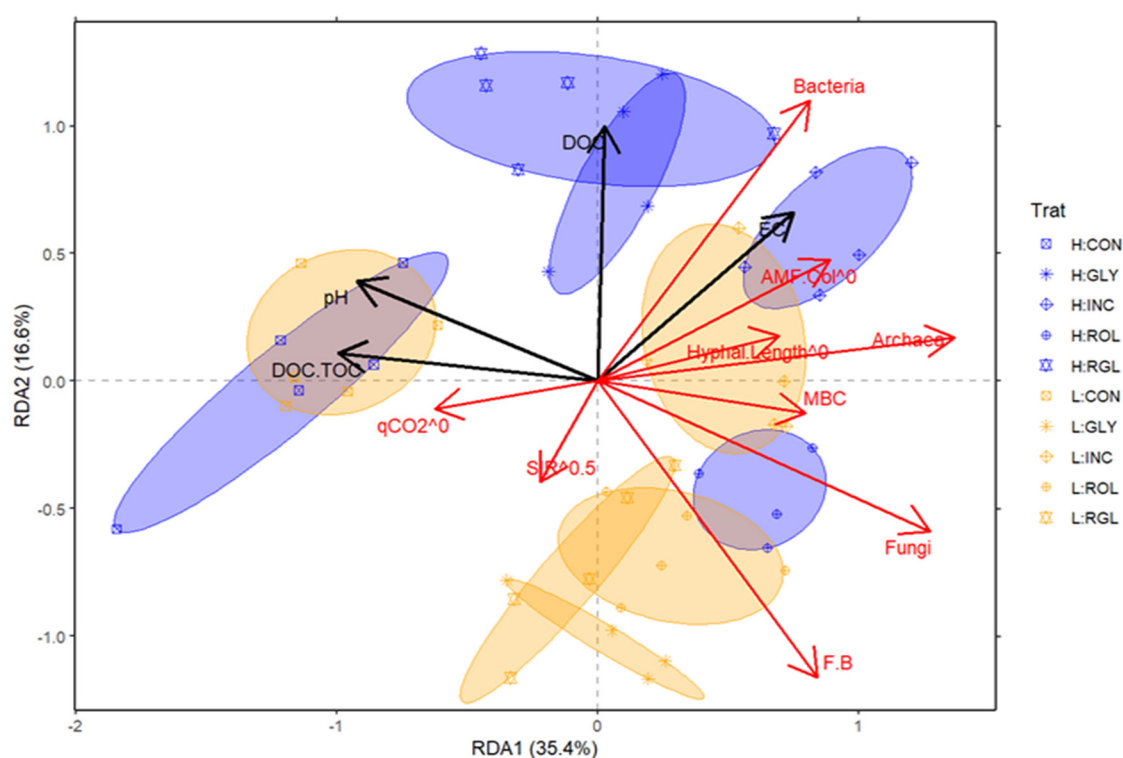


Figure S1. Redundancy Analysis (RDA) results for soil microbial variables, soil properties and ten combined treatments of termination methods and water levels. CON: control, INC: mowing + incorporation, GLY: glyphosate, RGL: glyphosate + roller, ROL: roller crimper; H: high water level, L: low water level; thin red arrows represent microbial response variables; qCO_2^0 : metabolic quotient, $SIR^{0.5}$: substrate-induced respiration, Col: AMF colonisation, MBC: microbial biomass carbon; thick black arrows represent soil explanatory variables; EC: electrical conductivity at 25°C, DOC: dissolved organic carbon, DOC.TOC: dissolved to total organic carbon.