

Supplementary material, Table S1: Other biological indicators used to quantify the impact of herbicides on soil.

Quantified biological indicators	Tested pesticides	References
Number of actinomycetes, fungi, bacteria; Nitrogen-fixing bacteria ( <i>Azotobacter</i> ); Microbial biomass C (MBC); Biomass Phosphorus (MBP); Microbial biomass N (MBN); Bioassays with different types of bacteria: <i>Pseudomonas putida</i> , <i>Pseudomonas aeruginosa</i> , <i>Pseudomonas fluorescens</i> , <i>Enterococcus faecalis</i> , <i>Lactobacillus lactis</i> , <i>Lactobacillus fermentum</i> , <i>Lactobacillus plantarum</i> , <i>Candida albicans</i> , <i>Allivibrio fischeri</i> (which exhibits natural bioluminescence); Symbiotic nitrogen-fixing bacteria	glyphosate; sulfonylurea tribenuron metil; alachlor, fluchloralin, trifluralin, pendimethalin, oxyfluorfen herbicides; imazethapyr and fumioxazin; triasulfuron; bromoxinil; diclobenilulul; bifenoxulul; 3,5,6-triclor-2- piridinol; dimetaclor; linuron; triasulfuron, metsulfuron methyl, chlorsulfuron and thifensulfuron methyl; sulfosulfuron, sulfentrazone, simazine, prometryne, terbutryn	Araujo et al., 2003; Rachedi et al., 2018; Trimurthulu et al., 2015; Arabab et al., 2014; Pertile M et al., 2020; Pose-Juan et al., 2017; Abbas et al., 2014; Perucci and Scarponi, 1994; Abbas et al., 2014; Sforzini et al., 2016; Abbas et al., 2018; Medo et al., 2021, Boldt and Jacobsen, 1998; Burul et al, 2022;
Soil respiration and respiratory coefficient; Cellulose digestion and determination of microbial community composition by metagenomic sequencing; Nitrification and isolation of strains with degrading capacity;	herbicides imazethapyr and fumioxazin; glyphosate; triasulfuron; chlorsulfuron, imazamox, atrazine; nicosulfuron;	Pertile M et al., 2020; Araujo et al., 2003; Pose-Juan et al., 2017; Nguyen et al., 2016; Jowenna et al., 2022; Qingyun et al., 2022;
Dehydrogenase activity (DHA); Urease, catalase, protease activity, alkaline phosphatase, arylsulfatase; Acid phosphatase activity in soil; $\beta$ -glucosidase, $\alpha$ -1,4-glucosidase, $\beta$ -1,4- glucosidase, $\beta$ -d-cellobiohydrolase and $\beta$ - xylosidase (fluorescence enzymatic assay and real-time PCR); Protease	sulfonylurea herbicides; herbicides imazethapyr and fumioxazin; carfentrazone-etil and oxadiargyl; triasulfuron; chlorsulfuron, nicosulfuron, imazamox, atrazine, pyrazosulfuron, butachlor and pretilachlor, trifluralin, propyzamide, prosulfocarb; nicosulfuron, butaclor, pirazosulfuron, glyphosate	Zhang et al., 2022; Perucci and Scarponi, 1994; Pertile M et al., 2020; Perucci and Scarponi, 1994; Bacmaga et al., 2012; Baćmaga et al., 2015; Saha et al., 2012; Santric et al, 2014; Jowenna et al., 2022; Latha and Gopal, 2010; Rasool et al., 2014
Hydrolysis of fuorescein diacetate (FDA)	glyphosate; herbicides imazethapyr and fumioxazin;	Araujo et al., 2003; Pertile M et al., 2020
Phosphlipid fatty acids profile (PLFA)	triasulfuron	Pose-Juan et al., 2017