

Exploring the Potential of White-Rot Fungi Exudates on the Amelioration of Salinized Soils

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Supplementary data

Number of Tables: 3

Number of Figures: 2

Supplementary Table S1: Characteristics of the soil used in the germination and seedling growth assays with *Lens culinaris*. Presented as average values. C_{org} – organic carbon content; N – nitrogen content; OM – organic matter content (%); WHC_{max} – maximum water holding capacity.

Tested soil	Natural soil (NS)	LUFA 2.2
Climate zone	Temperate (Mediterranean)	Temperate (Oceanic)
	Portugal	Germany
Land use	Sustainably managed	Sustainably managed
	(no chemicals; exclusion of grazing; proliferation of endemic vegetation > 20 years)	(no pesticides or organic fertilizers addition >5 years prior to collection)
OM (%)	3.67 ± 0.40	1.59 ± 0.13
C _{org} (%)	2.15 ± 0.23	2.2
N (%)	0.32 ± 0.09	0.22
pH	4.75 ± 0.29	5.5 ± 0.1
Soil type	sandy loam	sandy loam
<0.002 (%)	9.64 ± 1.39	10.7 ± 1.9
0.002 - 0.05 (%)	20.60 ± 7.31	15.7 ± 1.1

0.05 - 2.0 (%)	69.76 ± 8.42	73.6 ± 2.1
WHC _{max} (%)	36.61 ± 3.26	44.1 ± 6.0
Reference	Jurburg et al., 2018	Land- und Forstwirtschaftliche Untersuchungsanstalt LUFA Speyer, Germany

Supplementary Table S2: Physico-chemical parameters (conductivity – mScm⁻¹ and pH) of the exudate solutions obtained from the liquid culture of the two white rot fungi (*Trametes versicolor* and *Pleurotus sajor caju*) mixed with the seawater solutions (mScm⁻¹) that were later applied to the soils in the germination and seedling growth assay with *Lens culinaris*.

Pleurotus sajor caju

pH	Treatments			Conductivity (mScm ⁻¹)	Treatments		
Exudate proportion	26 mScm ⁻¹	16 mScm ⁻¹	8 mScm ⁻¹	Exudate proportion	26 mScm ⁻¹	16 mScm ⁻¹	8 mScm ⁻¹
0% (CTR-H ₂ O)	7.64	7.24	7.60	0% (CTR-H ₂ O)	0.14	0.12	0.16
1%	8.59	8.43	8.41	1%	26.90	15.80	8.51
6%	8.34	7.98	7.79	6%	24.40	16.30	7.87
12%	7.71	7.16	6.86	12%	23.40	16.30	8.39

Trametes versicolor

pH	Treatments			Conductivity (mScm ⁻¹)	Treatments		
Exudate proportion	26 mScm ⁻¹	16 mScm ⁻¹	8 mScm ⁻¹	Exudate proportion	26 mScm ⁻¹	16 mScm ⁻¹	8 mScm ⁻¹

0% (CTR-H ₂ O)	5.95	7.23	5.44	0% (CTR-H ₂ O)	0.08	0.09	0.14
1%	8.57	8.17	7.69	1%	24.62	17.21	8.75
6%	6.72	6.67	6.30	6%	25.25	17.99	8.73
12%	6.64	6.30	5.79	12%	25.16	17.36	8.60

Supplementary Table S3: Physico-chemical parameters (conductivity – mScm⁻¹ and pH) of three random soil samples (average ± standard deviation) collected at the end of the germination and seedling growth assay with *Lens culinaris*. CTR- control; T – salinity treatment; F- fungi elutriate %.

<i>Trametes versicolor</i>				
	Natural soil		LUFA 2.2	
	Conductivity (mScm ⁻¹)	pH	Conductivity (mScm ⁻¹)	pH
CTR	0.19 ± 0.01	4.77 ± 0.03	0.163 ± 0.006	5.78 ± 0.03
T26	23.13 ± 1.50	4.50 ± 0.11	22.99 ± 1.08	5.27 ± 0.04
T26+F1%	23.42 ± 1.13	4.51 ± 0.03	24.02 ± 0.38	5.34 ± 0.08
T26+F6%	22.34 ± 0.41	4.56 ± 0.02	23.79 ± 0.28	5.32 ± 0.04
T26+F12%	22.24 ± 1.25	4.48 ± 0.12	26.08 ± 0.35	5.26 ± 0.03
T16	13.96 ± 0.08	4.21 ± 0.07	16.56 ± 0.61	5.34 ± 0.02
T16+F1%	14.37 ± 0.39	4.24 ± 0.04	15.28 ± 0.41	5.37 ± 0.03
T16+F6%	15.08 ± 0.46	4.37 ± 0.02	14.77 ± 0.39	5.39 ± 0.02
T16+F12%	14.61 ± 0.34	4.32 ± 0.01	15.87 ± 0.21	5.43 ± 0.02
T8	8.00 ± 0.58	4.38 ± 0.02	9.75 ± 0.42	5.52 ± 0.03
T8+F1%	7.43 ± 0.15	4.49 ± 0.03	9.72 ± 0.15	5.52 ± 0.02
T8+F6%	7.34 ± 0.03	4.54 ± 0.02	9.64 ± 0.39	5.54 ± 0.03

T8+F12%	7.21 ± 0.05	4.56 ± 0.03	9.33 ± 0.30	5.45 ± 0.05
<i>Pleurotus sajor caju</i>				
	Natural soil		LUFA 2.2	
	Conductivity (mScm ⁻¹)	pH	Conductivity (mScm ⁻¹)	pH
CTR	0.20 ± 0.05	4.71 ± 0.06	0.17 ± 0.06	5.92 ± 0.07
T26	21.54 ± 1.86	4.39 ± 0.08	26.61 ± 2.29	5.55 ± 0.08
T26+F1%	21.15 ± 0.81	4.36 ± 0.03	28.03 ± 1.45	5.58 ± 0.08
T26+F6%	21.12 ± 0.85	4.35 ± 0.06	27.36 ± 0.75	5.45 ± 0.06
T26+F12%	20.93 ± 0.63	4.34 ± 0.04	27.23 ± 0.33	5.59 ± 0.03
T16	14.25 ± 0.85	4.27 ± 0.07	21.54 ± 5.17	5.70 ± 0.04
T16+F1%	13.48 ± 0.23	4.31 ± 0.09	18.58 ± 0.26	5.80 ± 0.03
T16+F6%	14.12 ± 0.12	4.50 ± 0.10	18.89 ± 0.70	5.81 ± 0.11
T16+F12%	13.72 ± 0.31	4.54 ± 0.06	19.02 ± 0.24	5.84 ± 0.02
T8	6.81 ± 0.21	4.67 ± 0.02	8.97 ± 0.77	5.94 ± 0.06
T8+F1%	6.44 ± 0.07	4.69 ± 0.03	8.75 ± 0.70	5.94 ± 0.02
T8+F6%	6.75 ± 0.07	4.81 ± 0.06	9.05 ± 0.37	5.85 ± 0.08
T8+F12%	7.00 ± 0.60	4.81 ± 0.05	9.68 ± 0.21	5.96 ± 0.02

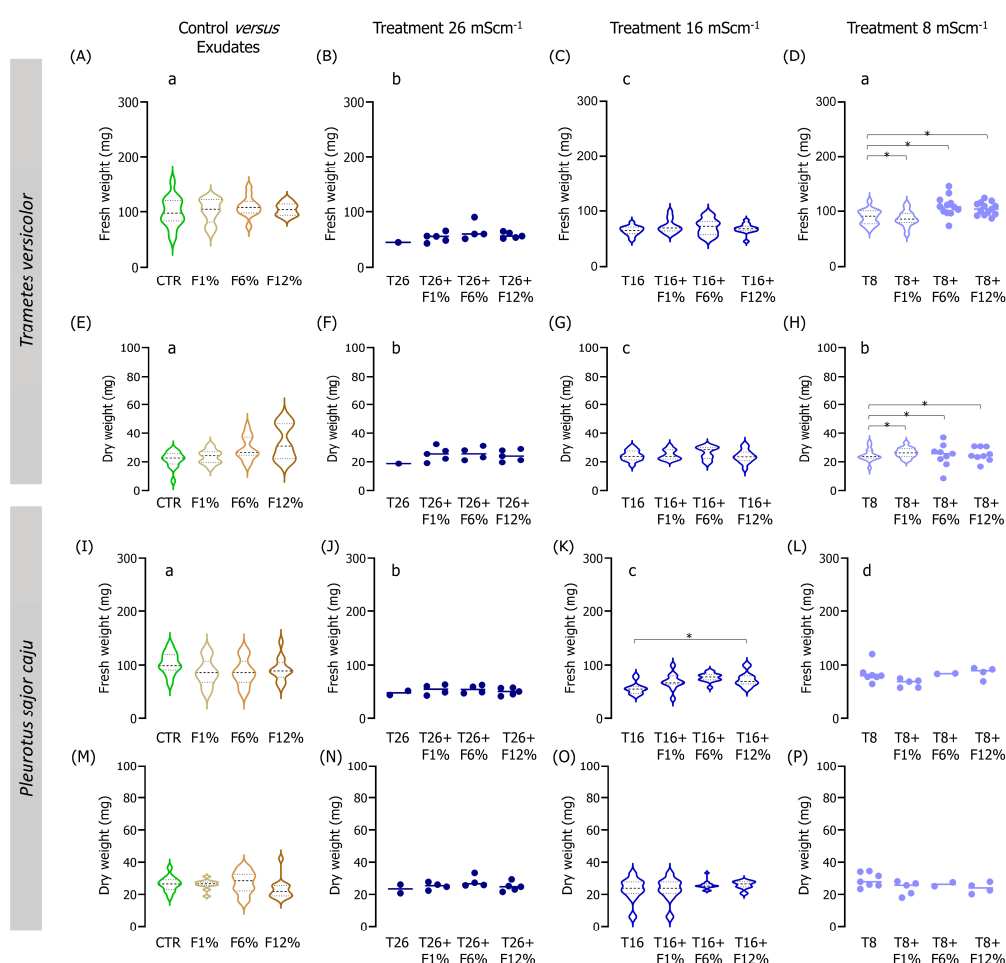


Figure S1. Violin plots of the seedling fresh and dry weights of *Lens culinaris* germinated in natural soil salinized at three different levels (8, 16, and 26 mScm⁻¹, designated as T8, T16, and T26, respectively) and supplemented with fungi exudates at three levels (1%, 6, and 12%, designated as F1%, F6%, and F12%, respectively). Graphics (A) through (H) present the results obtained from soil moistened with *Trametes versicolor* exudates, and graphics (I) through (P) present the results obtained from soil moistened with *Pleurotus sajor caju* exudates. CTR stands for control soil. Letters (a, b, c, d) stand for homogenous groups assessed only between CTR and the salinity treatments at 96-h in each assessed endpoint (Holm-Sidak, $p < 0.05$). The * stands for statistical differences between treatments (Holm-Sidak, $p < 0.05$). Note: data represented only by points means that no sufficient points were available for the construction of the violin.

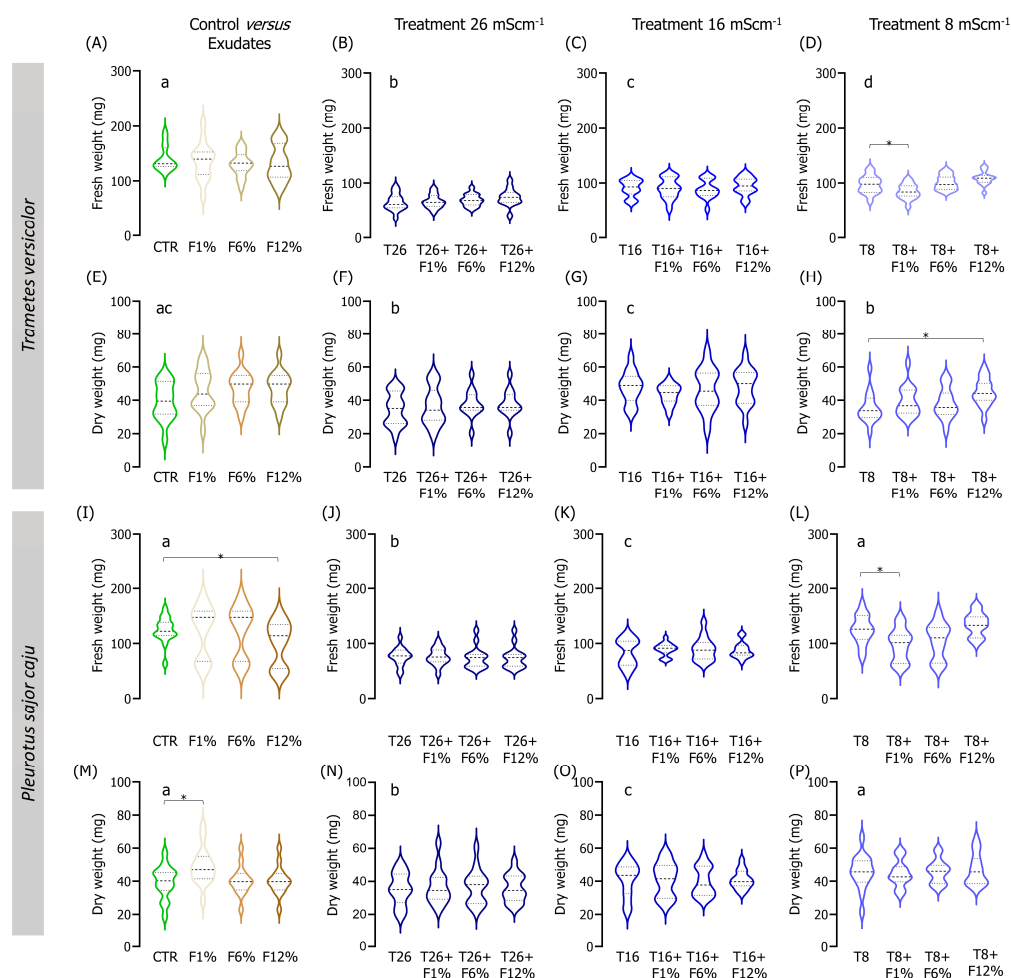


Figure S2. Violin plots of the seedling fresh and dry weights of *Lens culinaris* germinated in LUFA 2.2 soil salinized at three different levels (8, 16, and 26 mS.cm⁻¹, designated as T8, T16, and T26, respectively) and supplemented with fungi exudates at three levels (1%, 6, and 12%, designated as F1%, F6%, and F12%, respectively). Graphics (A) through (H) present the results obtained from soil moistened with *Trametes versicolor* exudates, and graphics (I) through (P) present the results obtained from soil moistened with *Pleurotus sajor caju* exudates. CTR stands for control soil. Letters (a, b, c, d) stand for homogenous groups assessed only between CTR and the salinity treatments at 96-h in each assessed endpoint (Holm-Sidak, $p < 0.05$). The * stands for statistical differences between treatments (Holm-Sidak, $p < 0.05$). Note: data represented only by points means that no sufficient points were available for the construction of the violin.