

Supplementary Information

An organic fertilizer 'doped' with a *Bacillus* strain improves melon and pepper yield, modifying the rhizosphere microbiome with negligible changes in the bulk soil microbiome

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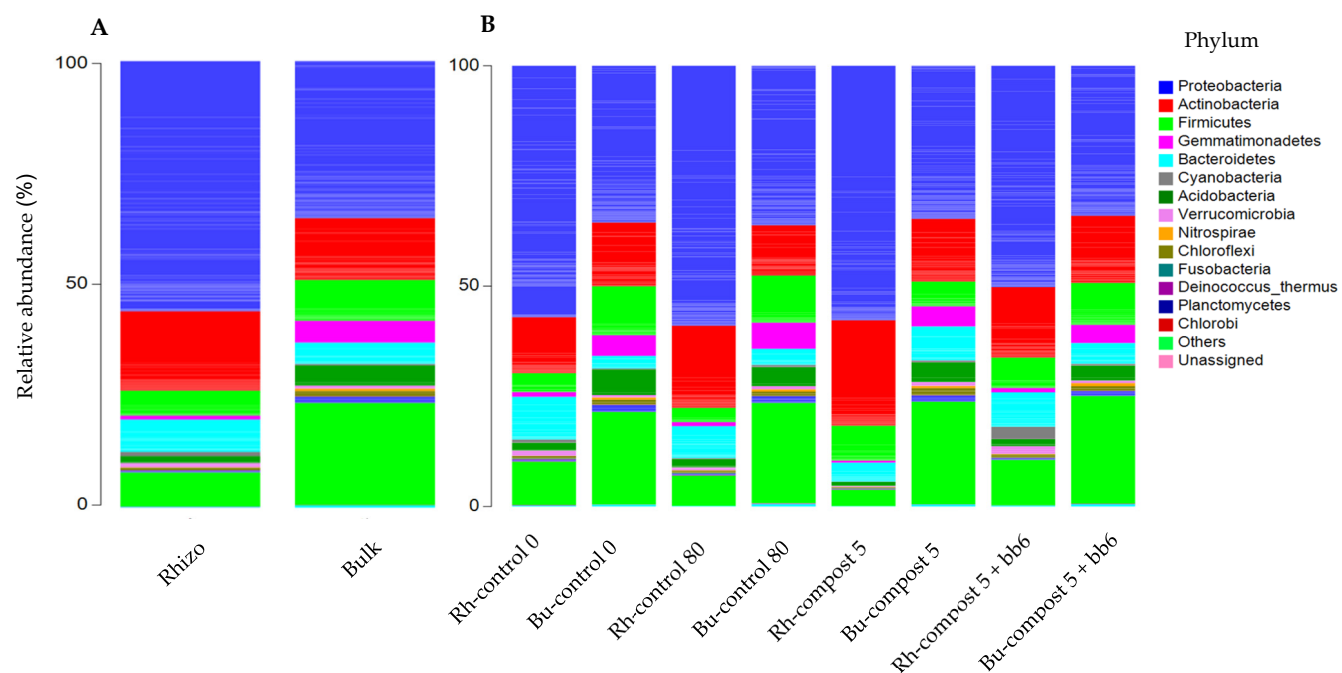


Figure S1. Stacked bar plot indicating the relative abundance of bacterial phyla for the factors: A) type of soil B) type of soil and treatment.

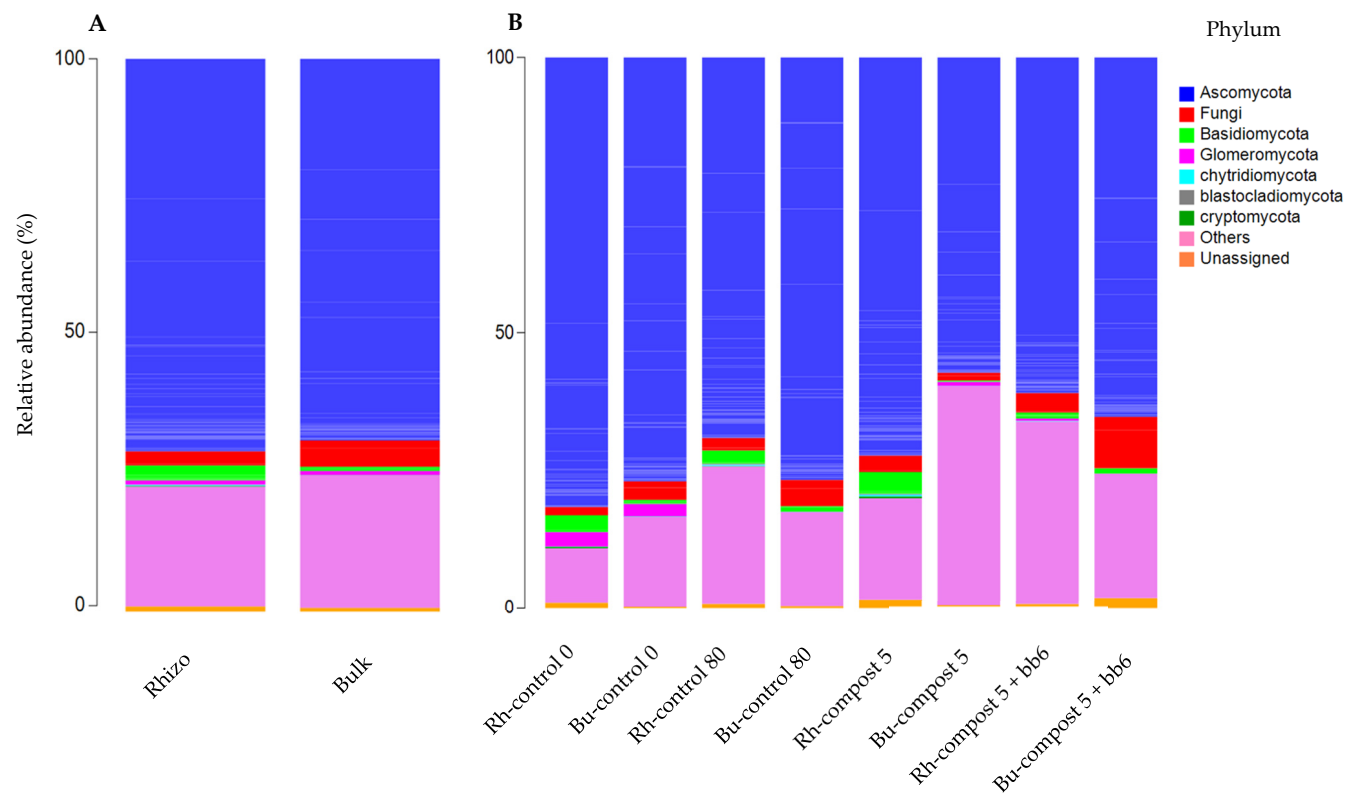


Figure S2. Stacked bar plot indicating the relative abundance of fungal phyla for the factors: A) type of soil
B) type of soil and treatment.

Table S1. Composition of the compost used.

Parameter	Value
N Kjeldahl (%)	2.08
P (mg/kg)	4683.30
K (mg/kg)	20,600.70
Ca (mg/kg)	76,196.00
Mg (mg/kg)	6097.30
Na (mg/kg)	2387.00
Fe (mg/kg)	1868.30
Mn (mg/kg)	101.20
Zn (mg/kg)	111.10
Cu (mg/kg)	7.49
Cr (mg/kg)	8.40
Ni (mg/kg)	4.90
Hg (mg/kg)	0.09
Cd (mg/kg)	0.19
Pb (mg/kg)	2.62
pH (soil:water)	8.55
Oxidizable organic carbon (%)	15.08
Organic Matter (%)	25.93
C/N Ratio	7.24
Electrical Conductivity (ds/m)	6.75
Particle size (mm)	1.55

Table S2. Composition of the biochar used for the experiment.

Parameter	Value
Humidity ^a	8.00
Volatiles ^a	7.30
Ash ^b	8.99
Carbon ^b	92.07
Hydrogen ^b	0.89
Nitrogen ^b	2.29
Sulphur ^b	0.01
Oxygen ^b	4.74
Higher calorific value ^b	29.04
Lower calorific value ^b	28.94

^a results expressed on a dry basis

^b results expressed on a dry and ash-free basis

Table S3. Soil analysis previous to the field trials. * Total N: organic + nitric + ammonia nitrogen.

Parameter		Melon crop		Pepper crop	
		2018	2019	2018	2019
	Sand	41.60	43.80	9.20	51.90
Texture (%)	Silt	28.10	28.90	25.40	31.10
	Clay	30.30	27.30	65.40	17.00
pH 1:2 (soil:water)		8.78	8.86	7.93	8.90
Electric conductivity (dS/m)		0.66	0.29	3.27	0.42
Organic matter (%)		1.04	1.24	0.98	1.34
Total nitrogen* (%)		0.069	0.068	0.071	0.076
Ratio C/N		8.72	10.62	8.02	10.26
P ₂ O ₅ (mg kg ⁻¹)		69.70	20.60	12.50	58.60
K (meq 100g ⁻¹)		1.86	0.51	1.32	1.86
Ca (meq 100g ⁻¹)		6.90	11.12	21.52	6.74
Mg (meq 100g ⁻¹)		2.72	3.41	4.27	2.45
Na (meq 100g ⁻¹)		1.49	0.90	4.04	0.98

Table S4. Climatic conditions of the locations selected for field trials in 2018 and 2019. Hmax: maximum high temperature (°C); Havg: average high temperature (°C); Lmin: minimum low temperature (°C); Lavg: average low temperature (°C).

Crop	Location	Date	Temperatures (°C)				Monthly rainfall (mm)	
			Hmax (°C)	Havg (°C)	Lmin (°C)	Lavg (°C)		
Melon	Rambla Salada	2018	April	25.8	22.6	8.3	12.8	7.4
			May	29.2	25.1	9.6	15.0	2.2
			June	33.6	29.2	14.7	19.1	10.2
			July	33.6	31.4	19.7	21.6	0.0
	Los Lorentes	2019	May	30.0	25.3	11.2	15.2	0.8
			June	36.9	29.0	15.5	18.7	3.0
			July	37.1	32.9	20.4	23.2	0.0
			August	35.2	32.7	19.5	22.7	4.4
Pepper	El Moaire	2018	June	33.6	29.2	14.7	19.1	10.2
			July	33.6	31.4	19.7	21.6	0.0
			August	36.8	33.6	22.2	23.7	0.0
			September	33.8	30.1	17.7	21.6	57.6
	Rambla Salada	2019	June	36.9	29.0	15.5	18.7	3.0
			July	37.1	32.9	20.4	23.2	0.0
			August	35.2	32.7	19.5	22.7	4.4
			September	32.9	29.4	16.3	20.5	50.4

Table S5. Mean values for yield, yield components and biomass production, obtained in the field trial for the melon crop. Means followed by the same letter did not differ significantly at $p \leq 0.05$ in Tukey's test.

Compost dose (t/ha)	Additive dose (%)	Fresh aerial vegetative biomass (g per plant)	Dry aerial vegetative biomass (g per plant)	Yield (kg ha ⁻¹)	Number fruits per plant	Fruit weight (g)	Number fruits per ha
2	0	1759 a	1315 a	37079 a	3.08 a	2193 a	16898 a
	3	1888 ab	1395 ab	38118 a	2.92 a	2387 b	15973 a
	6	2083 b	1553 b	48235 b	3.73 b	2371 b	20327 b
	average	1910	1421	41144	3.24	2317	17732
5	0	1638 a	1210 a	37488 a	3.11 a	2200 a	17034 a
	3	2264 b	1679 b	42933 b	3.37 a	2346 b	18319 ab
	6	2450 b	1806 b	45245 b	3.44 a	2400 b	18842 b
	average	2117	1565	41889	3.31	2315	18065

Table S6. Mean values for yield, yield components and biomass production, obtained in the field trial for the pepper crop. Means followed by the same letter did not differ significantly at $p \leq 0.05$ in Tukey's test.

Compost dose (t/ha)	Additive dose (%)	Fresh aerial vegetative biomass (g per plant)	Dry aerial vegetative biomass (g per plant)	Yield (kg ha ⁻¹)	Number fruits per plant	Fruit weight (g)	Number fruits per ha
2	0	281 a	-	43131 a	21.1 a	82.3 a	526806 a
	3	332 b	-	47586 ab	25.2 b	76.1 a	629869 b
	6	362 b	-	50593 b	24.7 b	82.5 a	617224 b
	average	325	-	47103	23.7	80.3	591300
5	0	294 a	-	44786 a	24.9 a	72.0 a	623534 a
	3	321 b	-	47932 ab	22.1 a	87.3 b	553266 a
	6	330 b	-	51298 b	23.5 a	88.4 b	587018 a
	average	315	-	48005	23.5	82.6	587939

Table S7. Mean values for leaf chlorophyll content, flowering and several fruit parameters obtained in the field trial for the melon crop. Means followed by the same letter did not differ significantly at $p \leq 0.05$ in Tukey's test.

Compost dose (t/ha)	Additive dose (%)	Chlorophyll (CCI)	Flowering (%)	Penetrometry (kg)	Fruit contour (cm)	Conductivity ($\mu\text{S cm}^{-1}$)	Solute concentration (mg l^{-1})
2	0	25.8 a	10 a	2.2 a	41.8 a	4.87 a	1567 a
	3	26.2 a	12 a	2.1 a	43.7 b	5.04 ab	1652 b
	6	30.3 b	19 b	2.2 a	43.2 b	5.23 b	1778 c
	average	27.4	14	2.2	42.9	5.05	1666
5	0	34.1 a	38 a	2.5 a	49.3 a	5.1 a	1630 a
	3	37.1 b	38 a	2.1 b	47.9 a	5.3 a	1685 a
	6	38.5 b	41 a	2.0 b	49.1 a	5.5 b	1909 b
	average	36.6	39	2.2	48.9	5.3	1742

Table S8. Mean values for leaf chlorophyll content, flowering and several fruit parameters obtained in the field trial for the pepper crop. Means followed by the same letter did not differ significantly at $p \leq 0.05$ in Tukey's test.

Compost dose (t/ha)	Additive dose (%)	Chlorophyll (CCI)	Fruit contour (mm)	Conductivity ($\mu\text{S cm}^{-1}$)	Solute concentration (mg l^{-1})
2	0	79.6 a	46.1 a	4.5 a	2753 b
	3	74.8 a	46.2 a	4.4 a	2330 a
	6	79.9 a	44.8 a	3.9 a	2408 a
	average	78.1	45.7	4.24	2497
5	0	83.5 a	46.2 a	4.2 a	2610 b
	3	86.3 a	45.9 a	3.9 a	2408 a
	6	85.9 a	47.1 a	3.8 a	2382 a
	average	85.2	46.4	3.9	2467