

¹ Figures & Tables: A commercial seaweed extract strongly
² structured microbial communities associated with tomato
³ and pepper roots and significantly increased crop yield

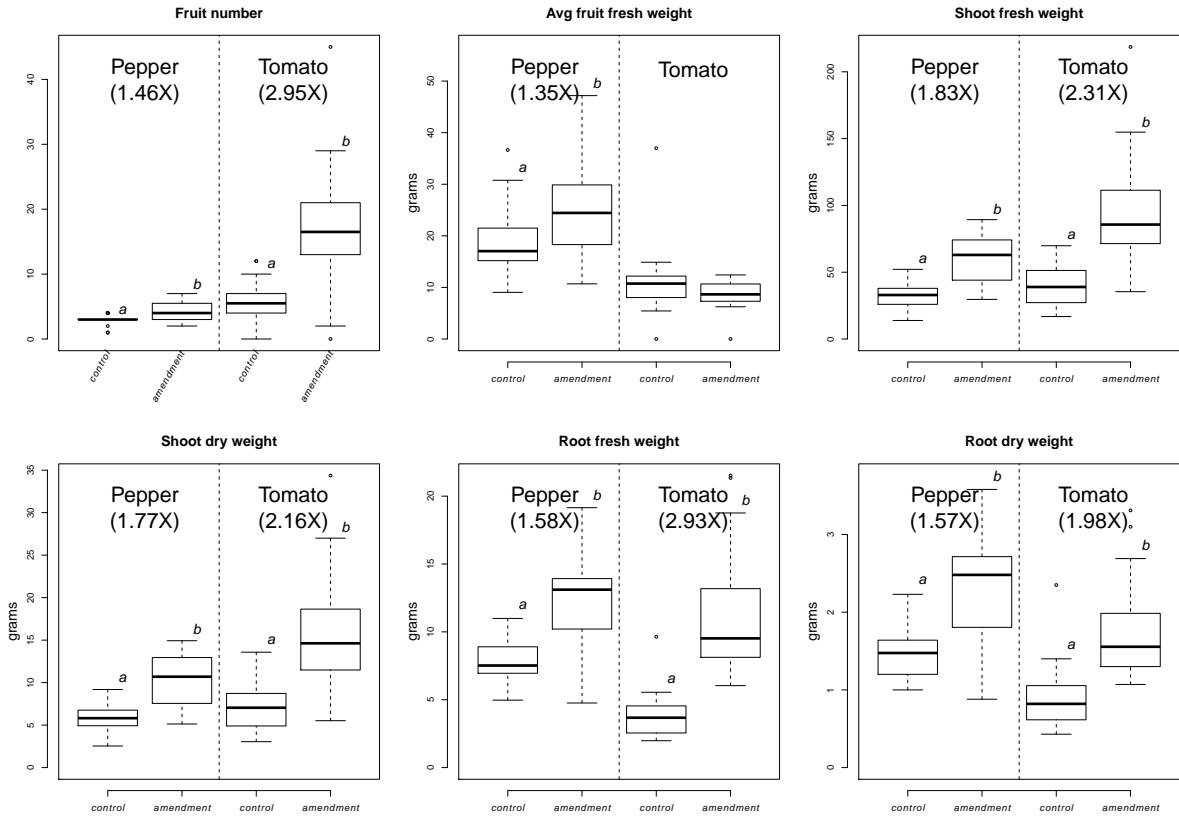
⁴ **Sébastien Renaud^{1,2}, Jacynthe Masse^{1,2}, Jeffrey P. Norrie³, Bachar Blal³ Mohamed Hijri^{1,2}**

⁵

Table 1: summary of PERMANOVAs

	amendment	planting	amendment:planting
fungi-soil (tomato)	0.05***	0.24***	0.02**
fungi-root (tomato)	0.29***	NA	NA
bacteria-soil (tomato)	0.06***	0.17***	0.04**
bacteria-root (tomato)	0.33***	NA	NA
fungi-soil (pepper)	0.03**	0.2***	0.02*
fungi-root (pepper)	0.1***	NA	NA
bacteria-soil (pepper)	0.06***	0.12***	0.02*
bacteria-root (pepper)	0.19	NA	NA

⁶ r^2 (percentage of variance explained by the term in the model); * p -value<0.05, **<0.005, ***<0.0005



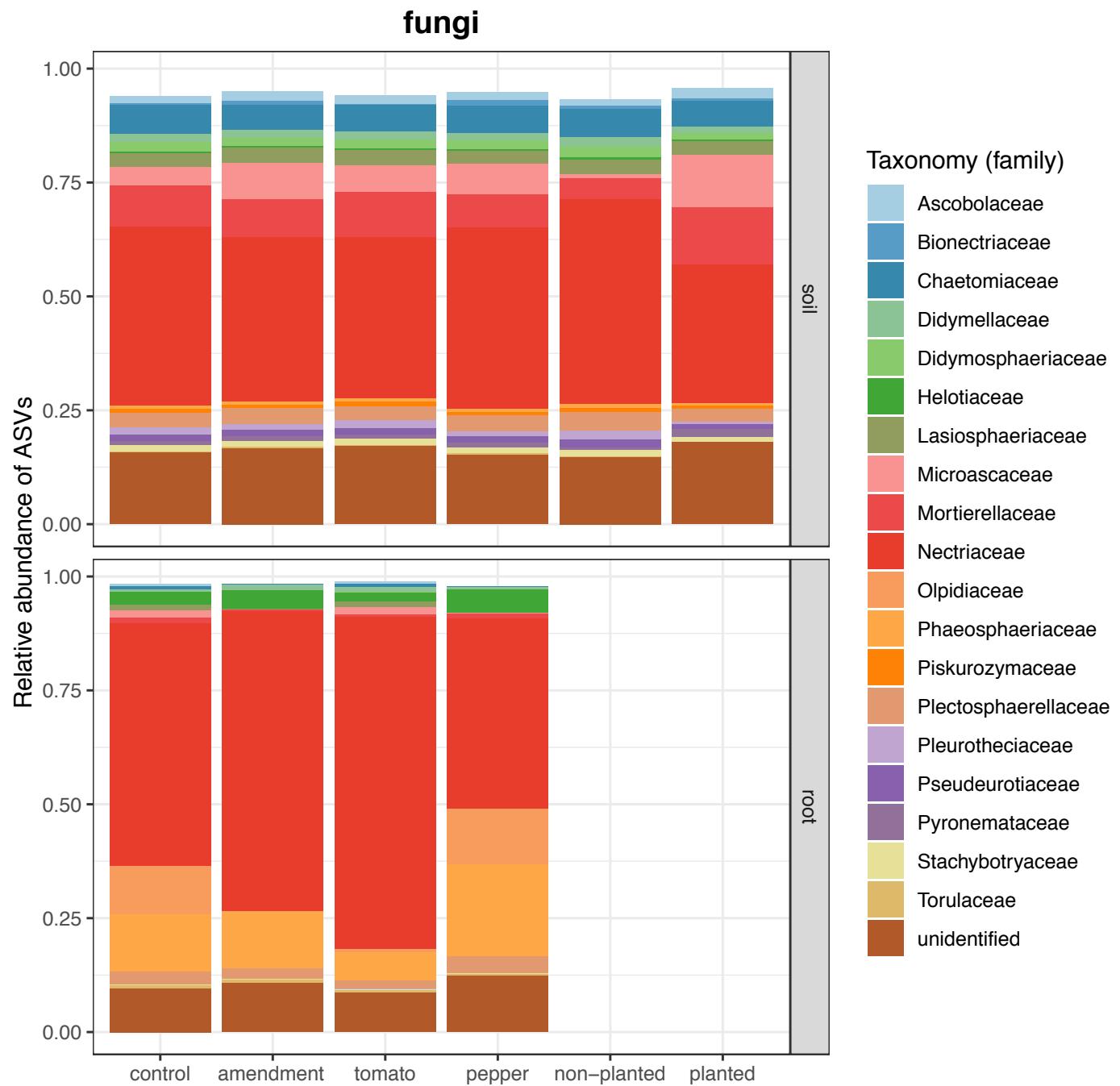
7

8 **Figure 1: Measures of plant productivity. *a* and *b* subscripts above boxplots denote significant**
9 **differences (p -value < 0.005) according to the amendment effect (tomato: hen manure + ANE,**
10 **pepper: ANE). Fold changes between the mean of the control and amended plants were also**
11 **noted for significant differences (for pepper and tomato separately).**

12

13

14

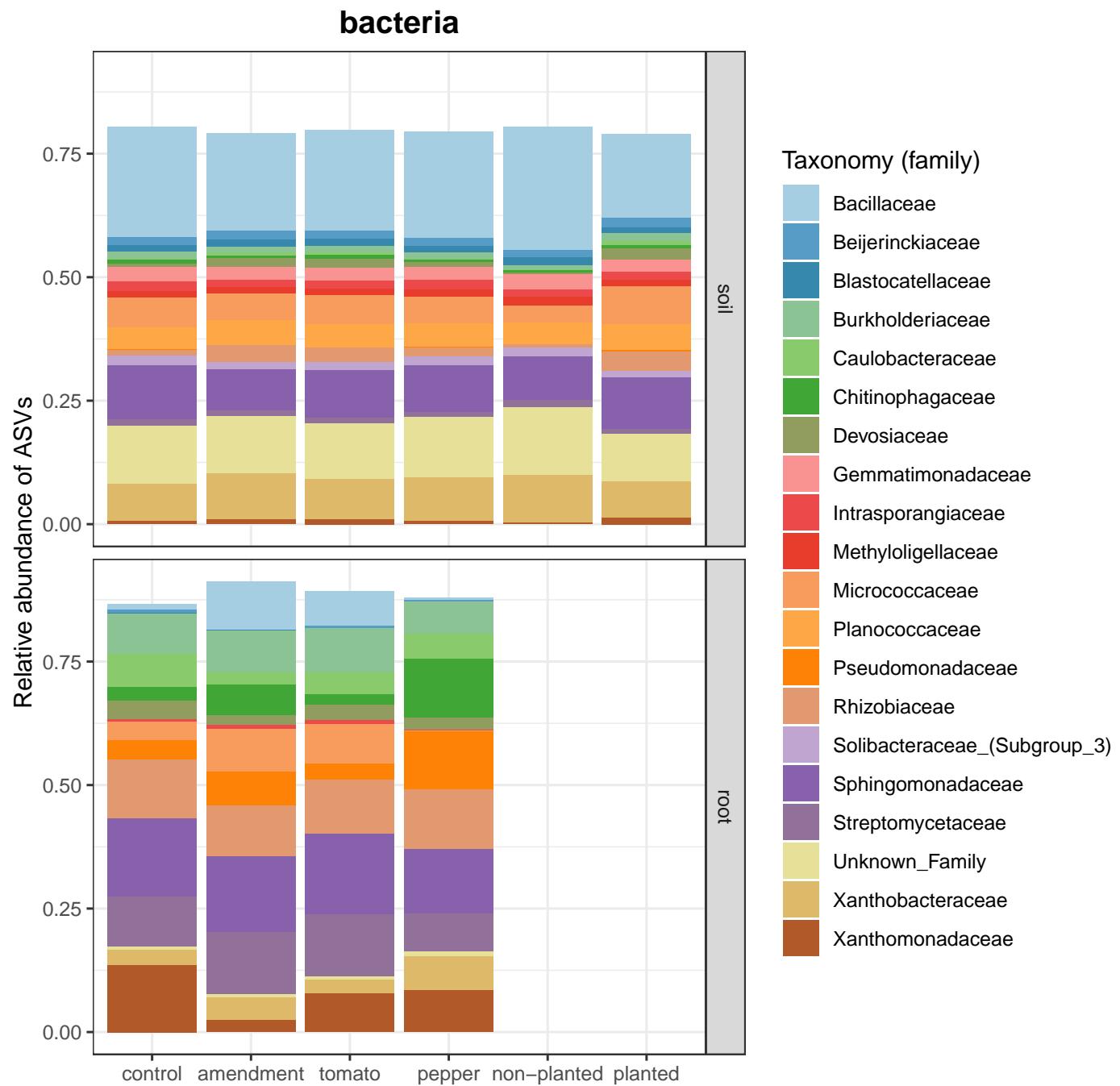


15

16 **Figure 2: Barplots of the relative abundance of fungal ASV for fungi**

17

18

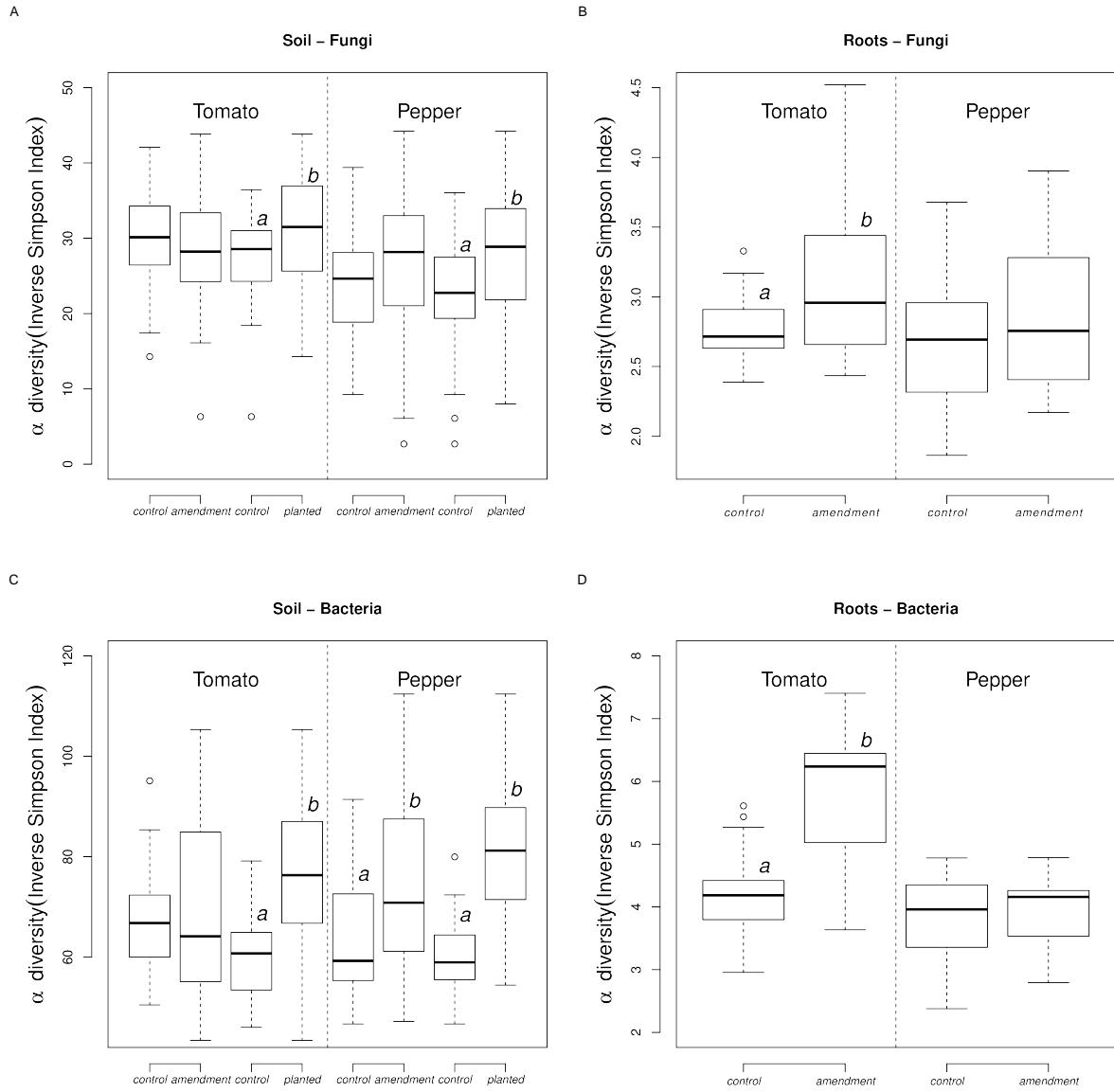


19

20 **Figure 3: Barplots of the relative abundance of bacterial ASV for bacteria**

21

22



23

24 **Figure 4: Boxplot of α -diversity according to the amendment and planting effect for fungal-root,**

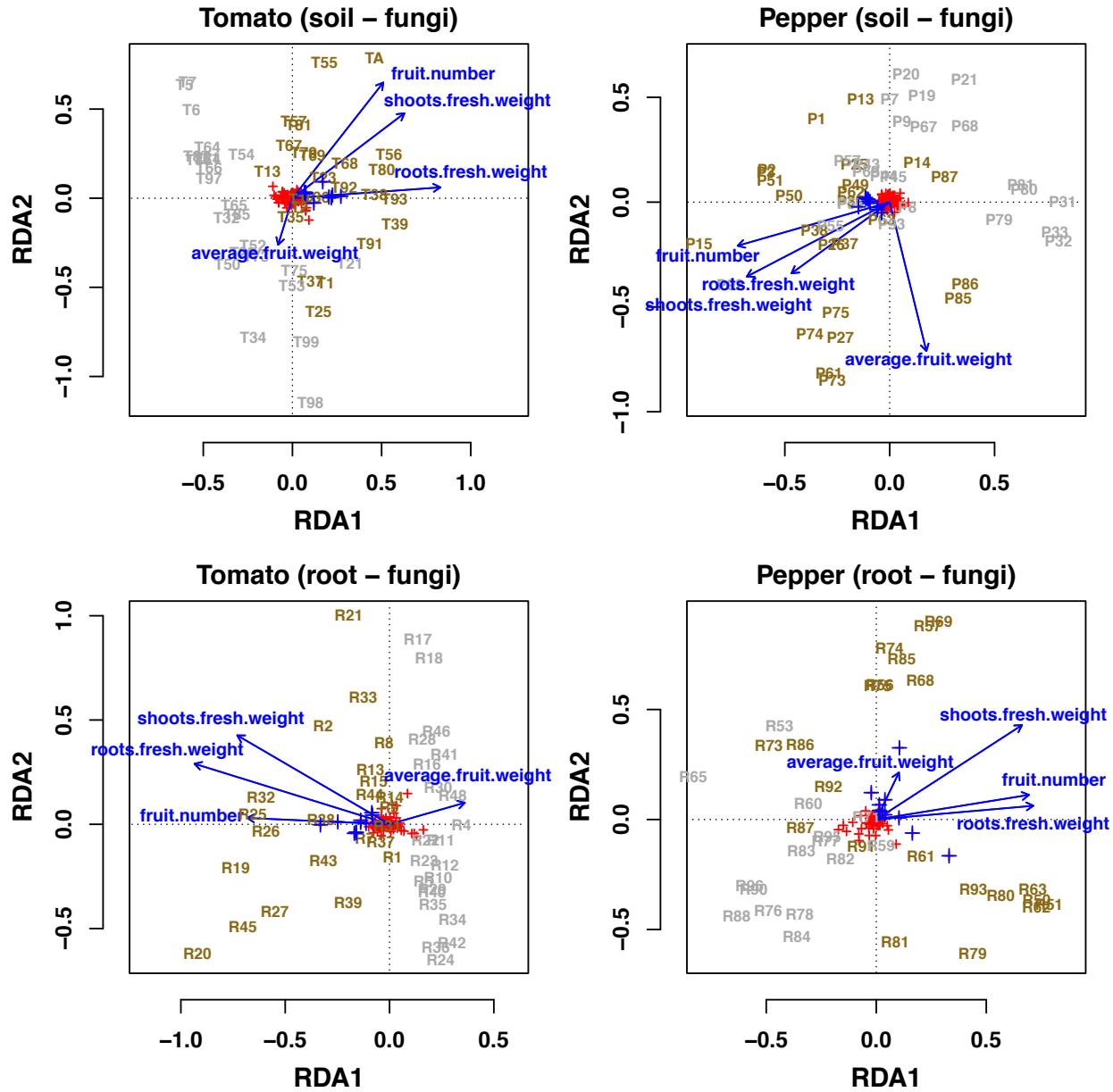
25 fungal-soil, bacteria-soil and bacteria-root for tomato and pepper. a and b subscripts above box-

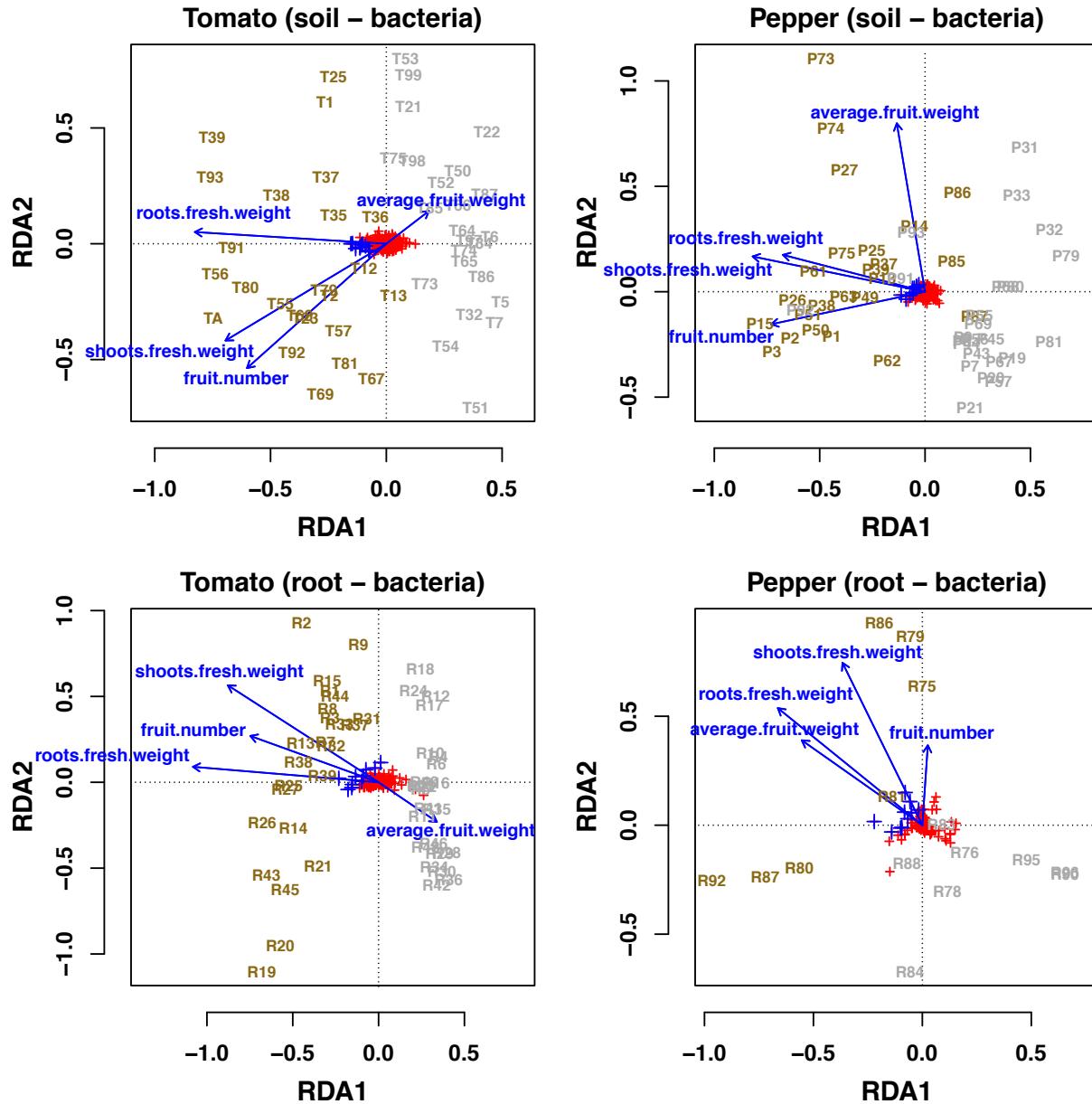
26 plots denote significant differences (p -value < 0.05).

27

28

29





38

39 **Figure 6: Redundancy analyses (RDA) for bacterial ASV.** Labeled samples were colored in gray
 40 (unfertilized) or dark yellow (fertilized). Red + signs represent individual ASV, while blue +
 41 signs represent the ten ASV most closely associated with the three productivity measures of
 42 root fresh weight, shoots fresh weight and fruit number. Blue arrows are the four productivity
 43 measures used as constraints in the ordinations.

44

45

Table S1: Soil characteristics (in *ppm* unless specified otherwise)

Soil Characteristics	Average value
pH	6.01
Conductivity (mmhos/cm)	0.68
Nitrate (N)	62.40
Ammonium	0.09
Phosphorus	0.41
Potassium	29.30
Calcium	64.40
Magnesium	13.80
Chloride	28.50
Sulfate	19.30
Sodium	17.80
Zinc	0.12
Manganese	0.06
Cooper	0.81
Iron	0.90
Aluminium	1.66

46

47

48

49

Tomato [cv: Totem Hybrid#A371, William Dam Seeds Ltd]																									
		P+		P-																					
bloc 1	P+F-	P-F-	P+F+	P-F+	bloc 2	P+F+	P-F+	bloc 3	P-F-	P+F+	bloc 4	P+F+	P-F+	bloc 5	P-F-	P-F+	bloc 6	P-F+	P+F-	bloc 7	P-F-	P+F-	bloc 8	P+F+	P-F-
bloc 1	P+F-	P-F-	P+F+	P-F+	bloc 2	P+F+	P-F+	bloc 3	P-F-	P+F+	bloc 4	P+F+	P-F-	bloc 5	P-F+	P+F-	bloc 6	P-F+	P+F-	bloc 7	P-F-	P+F-	bloc 8	P+F+	P-F+

Pepper [cv: Ace Hybrid#318, William Dam Seeds Ltd]																										
		P-F-		P+F+																						
bloc 1	P-F-	P+F+	P-F+	P+F-	bloc 2	P+F-	P-F+	P-F-	bloc 3	P+F-	P-F-	bloc 4	P+F-	P-F+	bloc 5	P-F+	P+F-	bloc 6	P+F+	P-F+	bloc 7	P+F-	P-F-	bloc 8	P+F+	P-F+
bloc 1	P-F-	P+F+	P-F+	P+F-	bloc 2	P+F+	P-F+	P-F-	bloc 3	P+F+	P-F+	bloc 4	P+F+	P-F-	bloc 5	P-F+	P+F-	bloc 6	P+F+	P-F-	bloc 7	P+F+	P-F+	bloc 8	P+F-	P-F-

50

51 **Table S2:** Randomized split block design for the tomato and pepper experiments

52

53

54

55

Table S3: Stella Maris® characteristics

Stella Maris® characteristics	Average value
Appearance	Viscous Brownish-Black Liquid
Odor	Marine Odor
Solubility in water (%)	100
pH	7.4 - 8.2
Carbohydrates	Alginic acid, Mannitol, Fucoidans
Organic matter content (%)	13.0 - 16.0
Total Nitrogen (N) (%)	0.1 - 0.6
Available phosphate (P2O5) (%)	< 0.2
Soluble potash (K2O) (%)	5.0 - 7.0
Sulphur (S) (%)	0.3 - 0.6
Magnesium (Mg) (%)	0.05 - 0.15
Calcium (Ca) (%)	0.05 - 0.15
Sodium (Na) (%)	0.7 - 1.2
Iron (Fe) (ppm)	30 - 90
Cooper (Cu) (ppm)	< 4
Manganese (Mn) (ppm)	3 - 11
Boron (B) (ppm)	20 - 40

56

57

58

59

Table S4: Summary of sequencing statistics and bioinformatics identification of ASV

	fungi-soil	fungi-root	bacteria-soil	bacteria-root
No sequences (sum)	976,000	309,000	920,000	535,000
No sequences (mean)	50,847	32,208	47,907	56,365
No seq. filtered (mean)	32,626	12,714	29,662	37,642
No seq. filt. merged (mean)	29,300	12,094	14,060	30,706
No seq. filt. merg. no chimeras (mean)	25,476	9,849	13,521	30,408
No samples	192	96	192	96
No samples trimmed	189	81	192	95
No ASV (sum)	6,112	845	9,352	2,023
No ASV trimmed (sum)	413	106	807	262
No ASV trimmed per sample (mean)	125	29	194	45

60 *No sequences (sum)*: Total number of paired-end sequencing reads per biotope. *No sequences*
 61 (*mean*): Average number of paired-end sequencing reads per sample. *No seq. filtered (mean)*: Total
 62 number of filtered paired-end sequencing reads per sample. *No seq. filt. merged (mean)*: Number
 63 of filtered paired-end sequencing reads merged per sample. *No seq. filt. merg. no chimeras (mean)*:
 64 Average Number of filtered paired-end sequencing reads merged, removing chimeras per sample.
 65 *No samples*: Number of samples. *No samples trimmed*: Number of samples, filtering out low
 66 quality samples. *No ASV (sum)*: Total number of ASV. *No ASV trimmed (sum)*: Total number of ASV,
 67 filtering out low abundance ASV and chloroplast or mitochondrial ASV for bacterial samples. *No*
 68 *ASV trimmed per sample (mean)*: Average number of filtered ASV per sample.

Table S5: summary of PERMANOVAs

	fungi-soil	fungi-root	bacteria-soil	bacteria-root
amendment	0.02***	0.08***	0.04***	0.19***
planted	0.21***	NA	0.13***	NA
species	0.02***	0.26***	0.02***	0.20***
amendment:planted	0.01**	NA	0.02***	NA
amendment:species	0.01*	0.04*	0.03***	0.05***
planted:species	0.01	NA	0.01**	NA
amendment:planted:species	0.01	NA	0.01*	NA

69 r^2 (percentage of variance explained by the term in the model); **p-value*<0.05, **<0.005, ***<0.0005

70

71



72

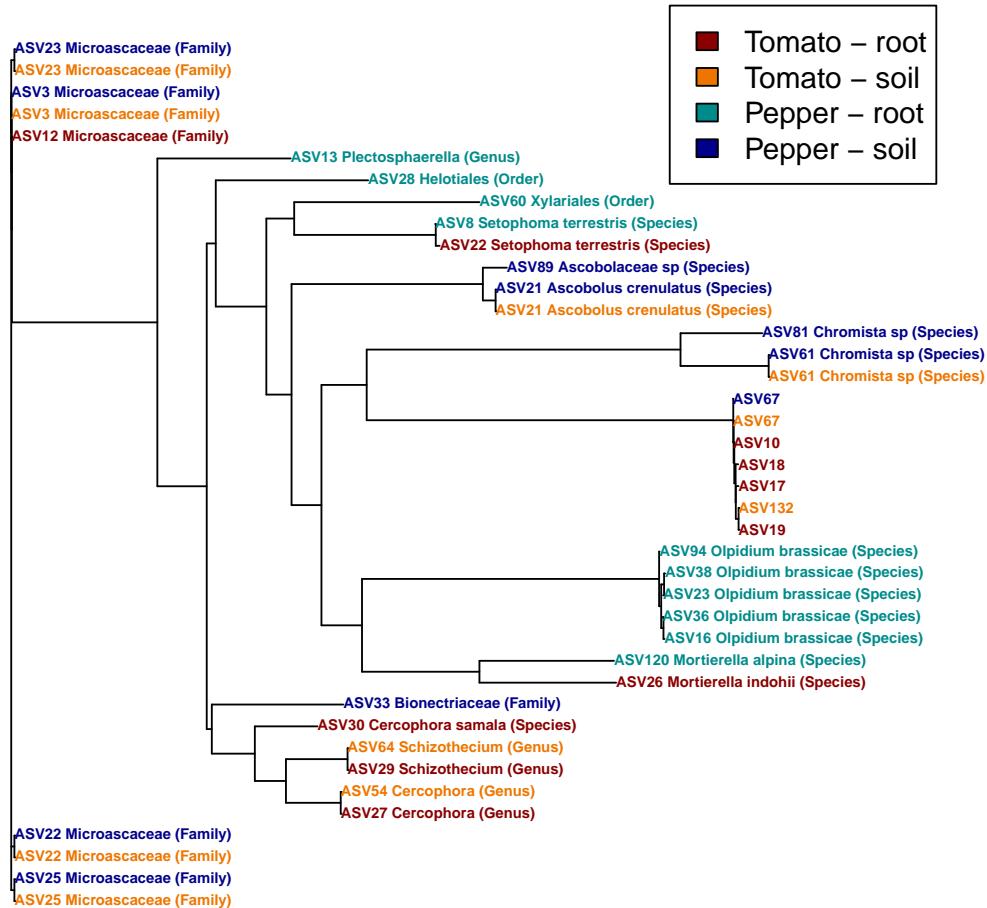
73 **Figure S1: Plant productivity. Photos were taken at the end of the experimental treatment. In**
74 **each photo, amended plants are on the left. A: pepper shoots, B: pepper roots, C: pepper fruits**
75 **and D: tomato fruits.**

76

77

78

Fungi



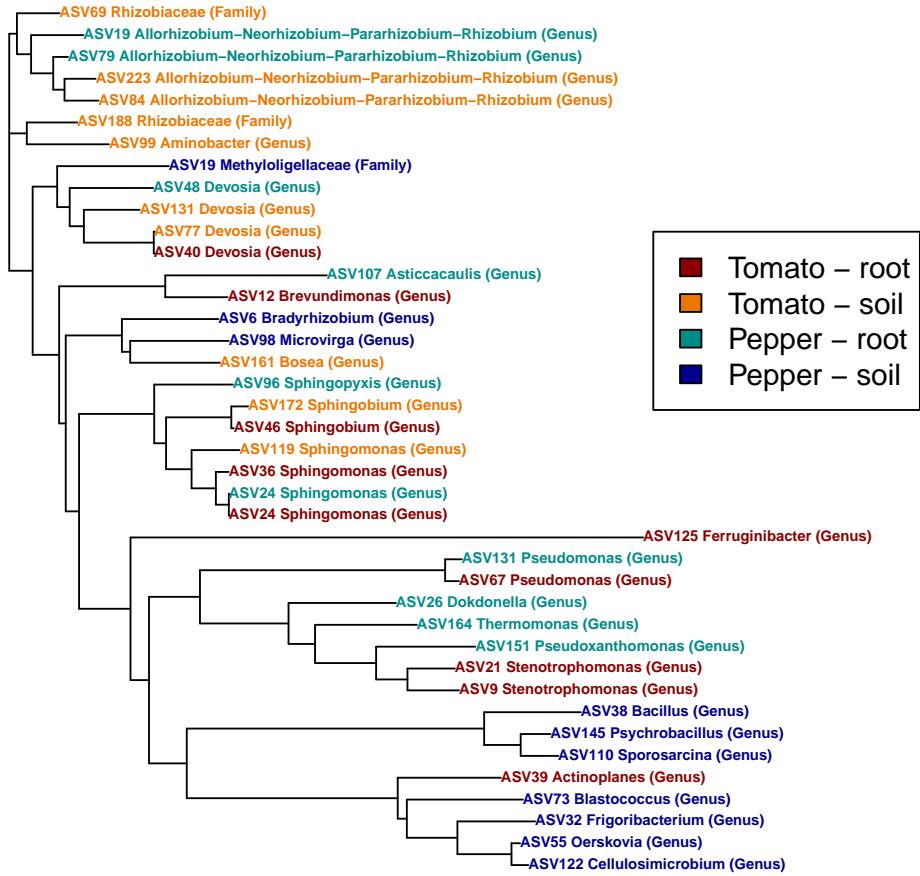
79

80 **Figure S2: Neighbor-Joining trees of candidates ASV (fungi) positively associated with produc-
81 tivity measures. The most accurate taxonomy assigned according to the RDP bayesian classifier
82 (from Phylum to species) was added as tip labels.**

83

84

Bacteria



85

86 **Figure S3: Neighbor-Joining trees of candidates ASV (bacteria) positively associated with pro-
87 ductivity measures. The most accurate taxonomy assigned according to the RDP bayesian clas-
88 sifier (from Phylum to species) was added as tip labels.**

89

90