

Supplementary material

**Fine root litter quality regulates soil carbon storage efficiency in
subtropical forest soils**

Running title: Litter quality regulates soil carbon storage

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Table S1 The results for Least Significant Difference (LSD) tests indicating differences among variables under control and two litter treatments at each sampling time for each variable. Data were showed mean±SE for each variable. C is carbon; MBC is microbial biomass carbon; SWC is soil water content; N is nitrogen; NH₄⁺ is ammonium-N; NO₃⁻ is nitrate-N; C/N is the carbon to nitrogen ratio; CN26: high-quality litter; CN46: low-quality litter. Different lowercases indicate significant differences between two groups.

Sampling time	Treatment	SoilC (g kg ⁻¹)	delta ¹³ C (‰)	Litter-derived C (g kg ⁻¹ soil)	Mineralization C	NetCchange	
1	Control	15.59±0.46a	-26.67±0.23a	--	0.41±0.46a	-0.41±0.46a	--
1	CN26	16.61±0.23a	-26.91±0.02a	-0.20±0.02a	-0.61±0.22a	0.61±0.23a	--
1	CN46	16.42±0.26a	-27.02±0.06a	-0.21±0.04a	-0.42±0.24a	0.42±0.26a	--
2	Control	8.25±0.53a	-26.87±0.06a	--	7.75±0.53a	-7.75±0.53a	--
2	CN26	10.54±0.78a	-26.76±0.03a	-0.04±0.02a	5.62±0.78a	-5.46±0.78a	--
2	CN46	10.44±0.38a	-26.71±0.04a	-0.01±0.02a	5.75±0.37a	-5.56±0.38a	--
3	Control	--	--	--	--	--	--
3	CN26	5.85±0.74a	-26.60±0.09a	0.03±0.02a	10.38±0.73a	-10.15±0.74a	--
3	CN46	7.36±0.62a	-26.70±0.02a	0.00±0.01a	8.83±0.62a	-8.64±0.62a	--
4	Control	18.21±0.41a	-25.85±0.06a	--	-2.21±0.41a	2.21±0.41a	--
4	CN26	18.46±1.03a	-25.89±0.29a	0.75±0.28a	-1.51±1.22a	2.46±1.03a	--
4	CN46	18.38±1.57a	-25.40±0.27a	0.92±0.21a	-1.26±1.46a	2.38±1.57a	--
5	Control	15.00±0.42a	-26.40±0.05a	--	1.00±0.42a	-1.00±0.42a	--
5	CN26	14.79±0.21a	-27.96±0.11b	0.34±0.06a	1.75±0.26a	-1.21±0.21a	--
5	CN46	14.53±0.08a	-28.32±0.08c	0.09±0.03b	1.77±0.06a	-1.47±0.08a	--
6	Control	15.21±0.25a	-26.35±0.06ab	--	0.79±0.25a	-0.79±0.25a	--
6	CN26	15.55±0.39a	-26.20±0.05a	0.40±0.03a	1.05±0.40a	-0.45±0.39a	--
6	CN46	15.02±0.42a	-26.46±0.02b	0.13±0.02b	1.31±0.40a	-0.98±0.42a	--
Sampling time	Treatment	MBC (mg kg ⁻¹)	Shannon index for bacterial	Shannon index for fungal	Macroaggregate (%)	Microaggregate (%)	Total aggregate (%)
1	Control	155.72±13.24a	--	--	38.78±1.41a	39.20±1.99a	77.98±0.83a

1	CN26	158.52±9.52a	--	--	45.41±3.61a	32.83±2.50a	78.69±0.76a
1	CN46	178.68±10.26a	--	--	35.30±2.43a	40.71±2.52a	76.01±0.52a
2	Control	--	--	--	49.11±2.58a	30.21±2.73a	79.31±0.58a
2	CN26	--	--	--	42.02±2.51ab	37.54±3.12ab	79.55±0.73a
2	CN46	--	--	--	32.84±2.42b	43.61±2.73b	76.45±1.12a
3	Control	--	--	--	43.31±4.46a	29.65±1.87a	72.96±5.89a
3	CN26	--	--	--	36.39±0.75a	38.88±4.61a	70.69±0.81a
3	CN46	--	--	--	37.45±2.73a	30.74±3.32a	68.18±1.84a
4	Control	--	--	--	--	--	--
4	CN26	--	--	--	--	--	--
4	CN46	--	--	--	--	--	--
5	Control	--	5.52±0.07a	3.74±0.08a	--	--	--
5	CN26	--	5.54±0.05a	3.71±0.11a	--	--	--
5	CN46	--	5.59±0.04a	3.46±0.09a	--	--	--
6	Control	-18.83±18.34a	5.90±0.04a	4.23±0.07a	32.05±4.05a	25.22±4.40a	57.27±4.74a
6	CN26	73.27±5.89b	5.92±0.07a	4.24±0.04a	20.39±0.60b	27.66±0.55a	48.05±0.14a
6	CN46	55.15±14.74ab	5.92±0.13a	4.14±0.11a	23.60±0.79ab	23.59±1.04a	47.19±0.33a

Sampling time	Treatment	Soil water content (%)	pH	NH ₄ ⁺ (mg N L ⁻¹)	NO ₃ ⁻ (mg N L ⁻¹)	SoilN (g kg ⁻¹)	SoilC/N
1	Control	25.70±0.77a	4.44±0.03a	--	--	1.35±0.03a	11.58±0.08a
1	CN26	25.91±0.71a	4.40±0.00a	--	--	1.43±0.04a	11.64±0.21a
1	CN46	25.11±0.83a	4.43±0.02a	--	--	1.46±0.02a	11.24±0.19a
2	Control	--	4.34±0.05a	--	--	0.95±0.06a	8.71±0.21a
2	CN26	--	4.43±0.06a	--	--	1.00±0.08a	10.54±0.12b
2	CN46	--	4.34±0.02a	--	--	1.03±0.03a	10.17±0.26b
3	Control	21.08±0.21a	4.38±0.04a	--	--	--	--
3	CN26	23.02±0.21b	4.37±0.01a	--	--	0.83±0.07a	6.97±0.25a
3	CN46	22.50±0.21b	4.38±0.01a	--	--	1.04±0.10a	7.13±0.31a
4	Control	19.99±0.56a	--	0.29±0.01a	1.26±0.13a	1.47±0.11a	12.55±0.70a
4	CN26	21.16±0.17a	4.40±0.05a	0.27±0.01a	2.11±0.47a	1.40±0.12a	13.25±0.38a

<u>4</u>	<u>CN46</u>	<u>21.48±0.41a</u>	<u>4.30±0.05a</u>	<u>0.22±0.01b</u>	<u>0.86±0.35a</u>	<u>1.36±0.13a</u>	<u>13.53±0.40a</u>
<u>5</u>	<u>Control</u>	<u>16.23±0.29a</u>	<u>3.89±0.04a</u>	--	--	<u>1.34±0.03a</u>	<u>11.23±0.08a</u>
<u>5</u>	<u>CN26</u>	<u>18.15±0.16b</u>	<u>3.84±0.02a</u>	--	--	<u>1.19±0.06ab</u>	<u>12.54±0.44b</u>
<u>5</u>	<u>CN46</u>	<u>18.36±0.44b</u>	<u>3.85±0.05a</u>	--	--	<u>1.17±0.01b</u>	<u>12.38±0.03b</u>
<u>6</u>	<u>Control</u>	<u>16.25±0.89a</u>	<u>3.88±0.06a</u>	<u>1.46±0.04a</u>	<u>0.79±0.30a</u>	<u>1.38±0.03a</u>	<u>11.04±0.06a</u>
<u>6</u>	<u>CN26</u>	<u>18.70±0.80a</u>	<u>4.03±0.08a</u>	<u>1.44±0.01a</u>	<u>0.90±0.30a</u>	<u>1.06±0.03b</u>	<u>14.69±0.10b</u>
<u>6</u>	<u>CN46</u>	<u>16.98±0.58a</u>	<u>4.02±0.04a</u>	<u>1.39±0.09a</u>	<u>0.74±0.21a</u>	<u>1.03±0.03b</u>	<u>14.64±0.05b</u>

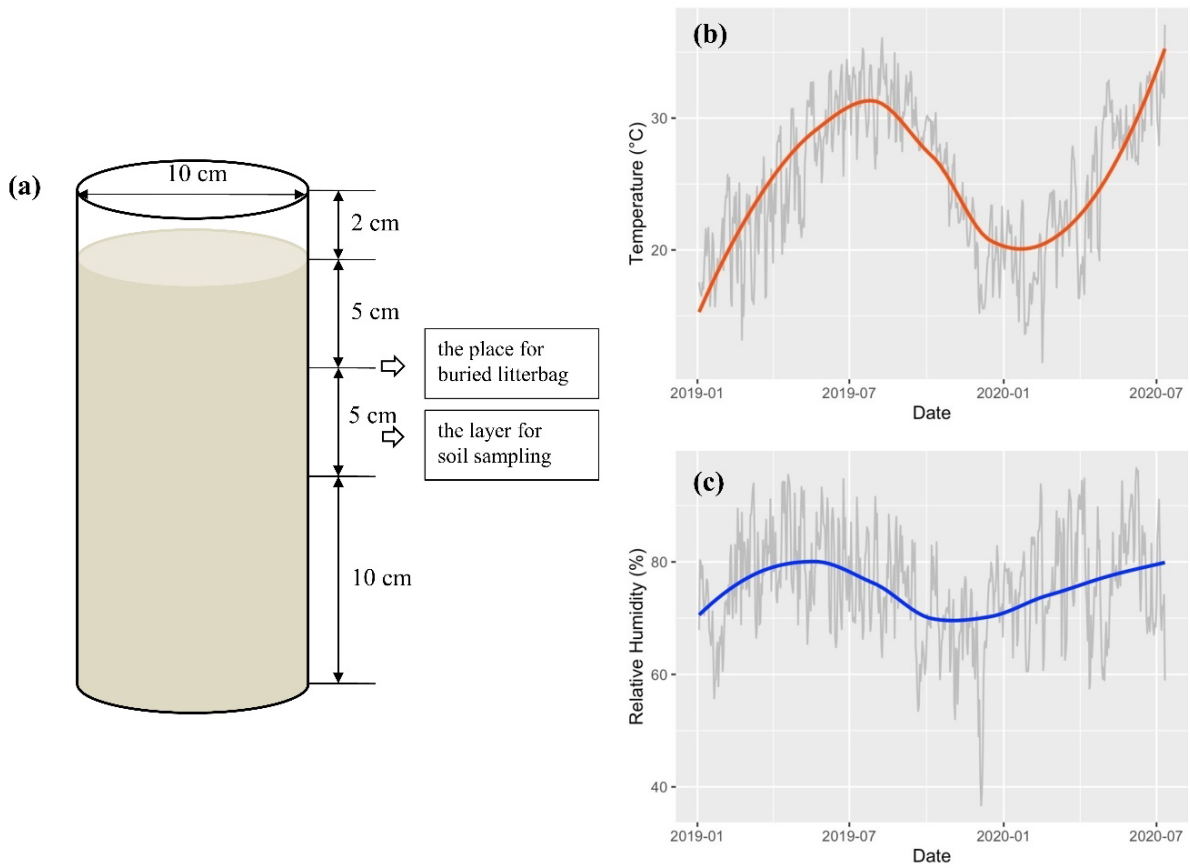


Figure S1 (a) Design of the PVC columns used for a two-year root litter decomposition experiment, showing (b) daily mean air temperature ($^{\circ}\text{C}$), and (c) daily mean relative humidity (%) in the greenhouse from January 2019 to July 2020.

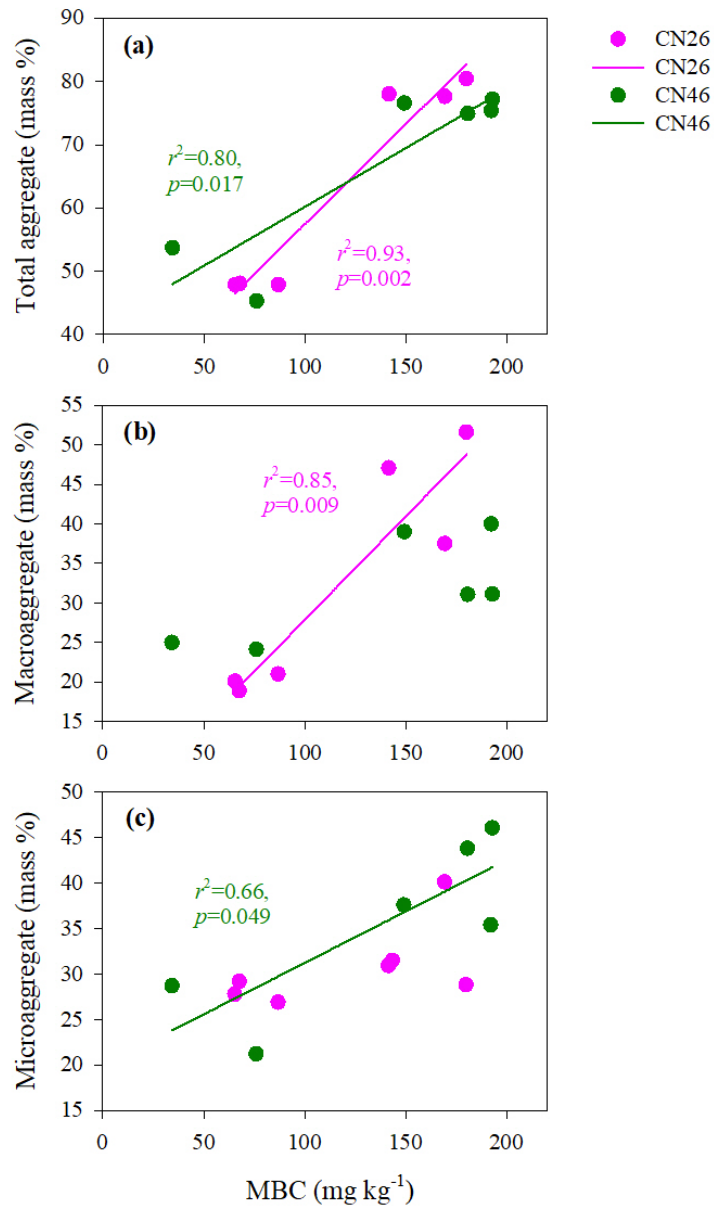


Figure S2 Correlations between microbial biomass carbon (MBC, mg kg^{-1}) and (a) total soil aggregate (mass %), (b) macroaggregate (mass %) and (c) microaggregate (mass %) for *Cryptocarya chinensis* (CN26) and *Syzygium acuminatissimum* (CN46) fine root litters. The correlations were significant when $P < 0.05$.

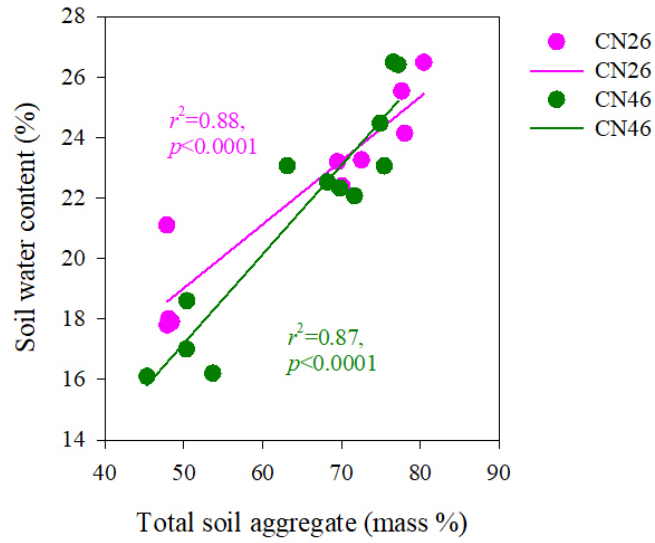


Figure S3 Correlations between total soil aggregate (mass %) and soil water content (%) for *Cryptocarya chinensis* (CN26) and *Syzygium acuminatissimum* (CN46) fine root litters. The correlations were significant when $P<0.05$.