

Supplement of Biogeosciences, 14, 2851–2863, 2017
<https://doi.org/10.5194/bg-14-2851-2017-supplement>
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Supplement of

Biochar reduces yield-scaled emissions of reactive nitrogen gases from vegetable soils across China

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1 **Supplementary information**

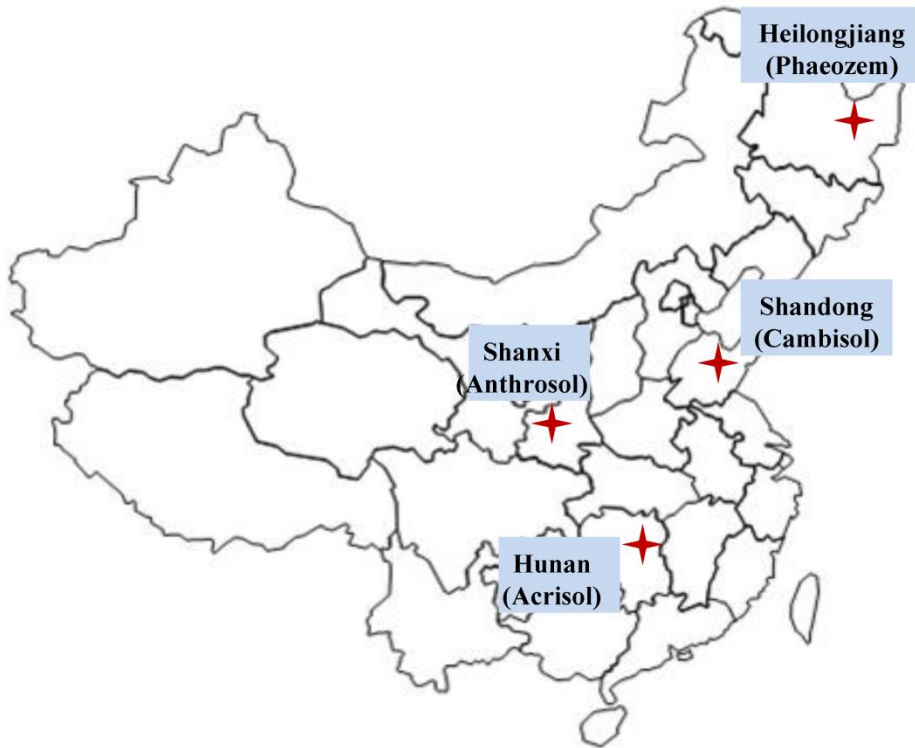
2 **Fig. S1** Map showing the sampling sites in China.

3 **Fig. S2** Dynamics of water filled pore space (WFPS), air temperature and soil temperature during the vegetable
4 cultivation period.

5 **Fig. S3** Scanning electron microscope (SEM) images of the biochars derived from Bw (a, b and c) and Bm (d, e and f).

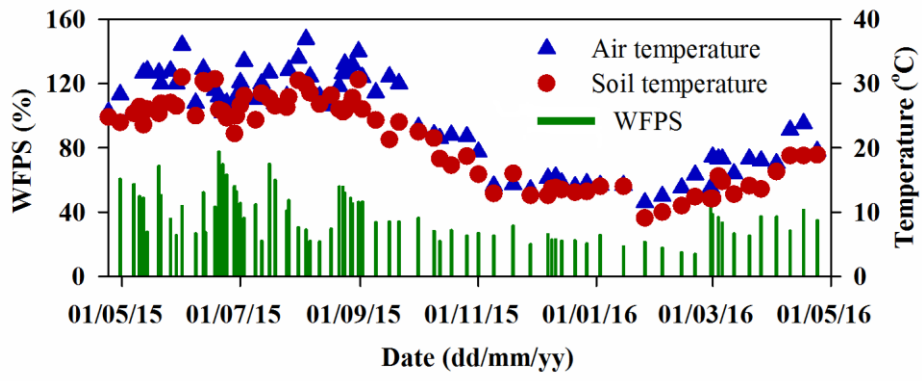
6 Same magnification for a and d ($\times 50$), b and e ($\times 400$) and c and f ($\times 2000$).

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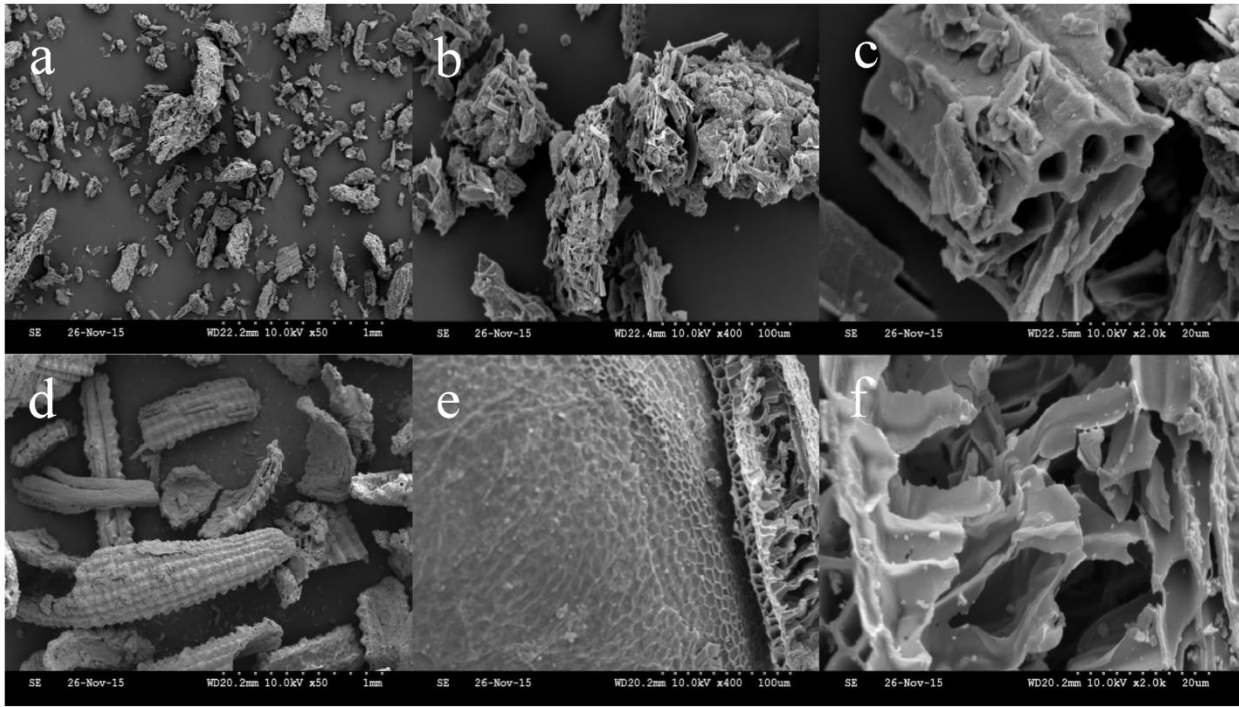
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1 **Table S1**

2 Characteristics of the vegetable soils and biochars used in the experiment.

Item	Vegetable soil				Biochar	
	Acrisol	Anthrosol	Cambisol	Phaeozem	Bw	Bm
Texture	sandy loam	silt (sandy) clay loam	silt (sandy) loam	silt (sandy) loam		
sand, %	47.1	17.7	24.7	31.6		
silt, %	40.0	59.6	60.4	52.8		
clay, %	12.9	22.7	14.9	15.6		
total C (g kg ⁻¹)	7.6	9.8	8.2	26.8	449.1	461.2
total N (g kg ⁻¹)	1.2	1.4	1.0	2.1	6.5	12.0
C/N	6.3	7.0	8.2	12.8	69.1	38.4
H (g kg ⁻¹)					10.5	16.1
O (g kg ⁻¹)					52.4	96.7
H/Corg					0.3	0.4
pH	5.6	7.6	8.2	7.6	9.7	10.0
EC (ds m ⁻¹)	1.8	1.1	0.2	0.2	10.6	3.3
DOC (g kg ⁻¹)	0.5	0.4	0.2	0.7	0.9	1.3
CEC, cmol kg ⁻¹	6.1	13.2	15.3	20.3	22.1	22.7
WHC, %	41.6	50.1	54.4	59.6	362.0	304.1
NH ₄ ⁺ -N (mg kg ⁻¹)	105.3	32.2	28.4	31.6	4.3	4.0
NO ₃ ⁻ -N (mg kg ⁻¹)	415.8	307.6	21.2	30.8	6.1	3.2
Bulk density (g cm ⁻³)	1.2	1.4	1.1	1.1		
Surface area (m ² g ⁻¹)					21.3	9.3
Ash content, %					29.1	38.6

3 EC: electronic conductivity; DOC: dissolved organic carbon; CEC: cation exchange capacity; WHC: water holding capacity

Table S2

Crop rotation, tillage practices, and fertilizer application from April 2015 to April 2016.

Crop	Date	Agricultural activity	Fertilizer N rate (kg N ha ⁻¹)	Fertilizer P rate (kg N ha ⁻¹)	Fertilizer K rate (kg N ha ⁻¹)
Amaranth ₁	04/22/2015	Tillage			
	04/29/2015	Fertilizer application and planting	240	240	240
	06/13/2015	Harvesting			
	06/14/2015	Tillage			
Amaranth ₂	06/19/2015	Fertilizer application and planting	0	0	0
	07/31/2015	Harvesting			
	08/01/2015	Tillage			
Tung choy	08/20/2015	Fertilizer application and planting	200	200	200
	11/27/2015	Harvesting			
	11/28/2015	Tillage			
Spinach	12/06/2015	Fertilizer application and planting	150	150	150
	01/28/2016	Harvesting			
	01/09/2016	Tillage			
Coriander herb	02/28/2016	Fertilizer application and planting	180	180	180
	04/29/2016	Harvesting			
	04/30/2016	Tillage			