Table S1

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

Iterm	Vegetable soil				Biochar	
	HN	SX	SD	HLJ	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
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

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.

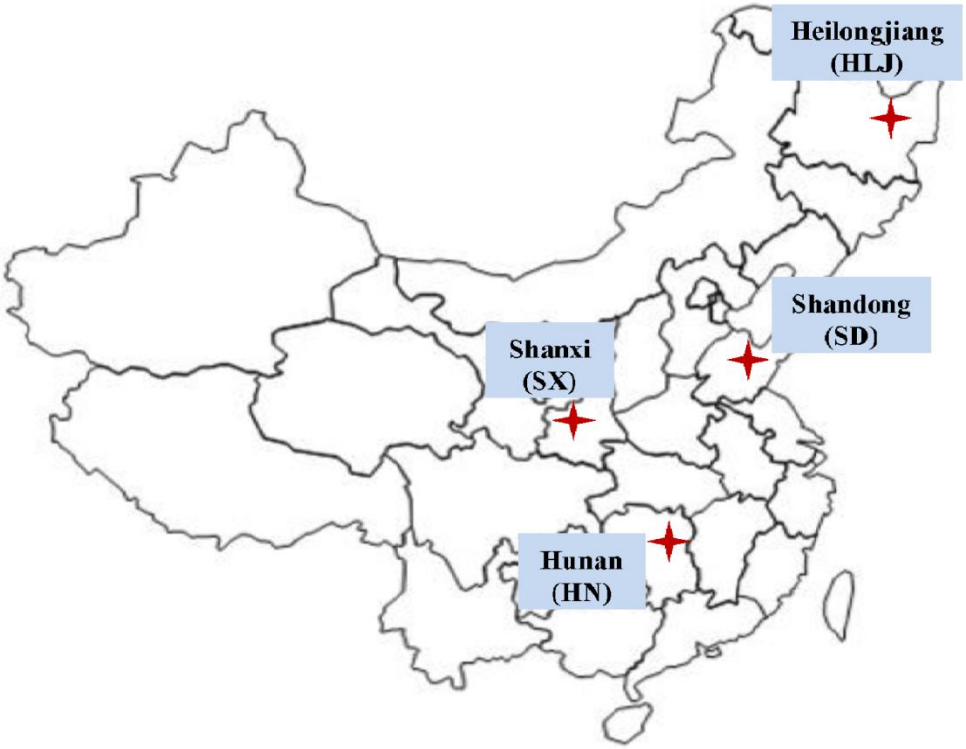
Crop	Date	Agricultural activity	Fertilizer N rate (kg N ha^{-1})	Fertilizer P rate (kg N ha^{-1})	Fertilizer K rate (kg N ha^{-1})
$Amaranth_1$	04/22/2015	Tillage			
	04/29/2015	Fertilizer application and planting	240	240	240
	06/13/2015	Harvesting			
	06/14/2015	Tillage			
$Amaranth_2$	06/19/2015	Fertilizer application and planting	0	0	0
	07/31/2015	Harvesting			
	07/32/2015	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			

Supplementary information

Fig. S1 Map showing the sampling sites in China.

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

Fig. S3 Scanning electron microscope (SEM) images of the biochars derived from Bw (a, b and c) and Bm (d, e and f). Same magnification for a and d (× 50), b and e (× 400) and c and f (× 2000).



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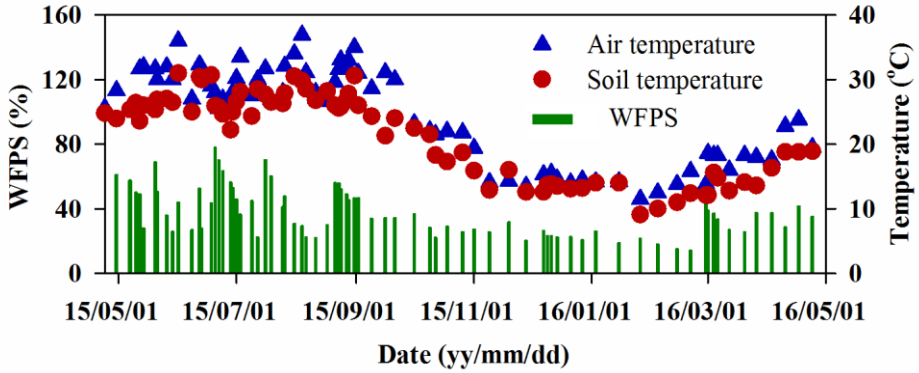
160
120
80
40
0
WFPS (%)
40
30
20
10
0
Temperature (°C)
Air temperature
Soil temperature
WFPS
15/05/01
15/07/01
15/09/01
15/11/01
16/01/01
16/03/01
16/05/01
Date (yy/mm/dd)

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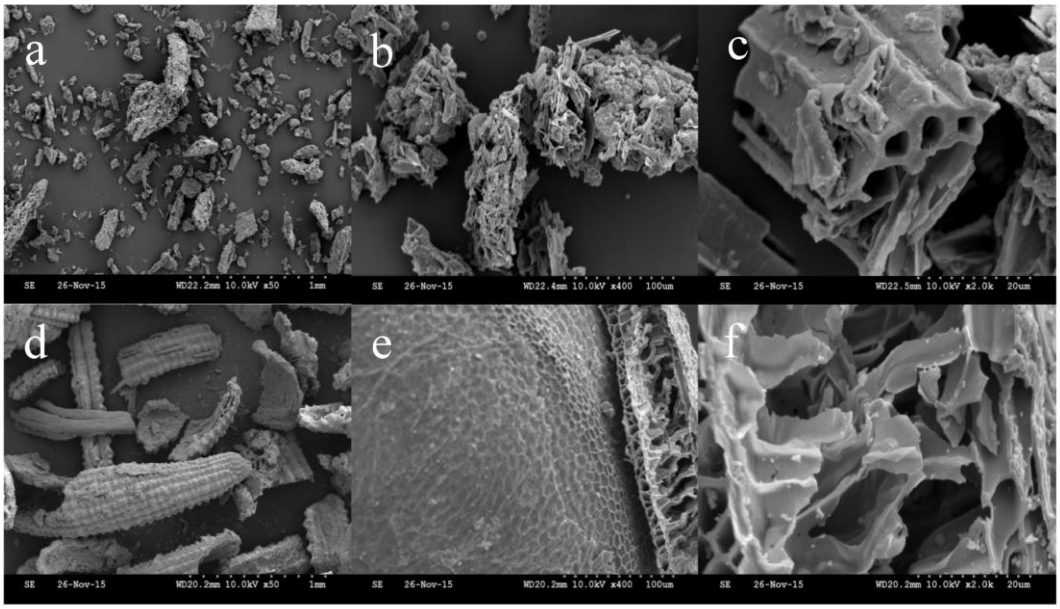
a
b
c
SE 26-Nov-15 WD22.2mm 10.0kV x50 1mm
SE 26-Nov-15 WD22.4mm 10.0kV x400 100um
SE 26-Nov-15 WD22.5mm 10.0kV x2.0k 20um
d
e
f
SE 26-Nov-15 WD20.2mm 10.0kV x50 1mm
SE 26-Nov-15 WD20.2mm 10.0kV x400 100um
SE 26-Nov-15 WD20.2mm 10.0kV x2.0k 20um

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