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Interacting controls of pyrolysis temperature and plant taxa on the reactivity of PyOM in a fire prone forest soil Supplemental Information

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1. Paper Mining

A web of science search was performed in January 2017 using the key phrases, “biochar”, “pyrogenic organic matter”, “pyrogenic carbon”, “black carbon”. The results were further filtered using the terms “isotopes”, “13C”, “14C”, and “15N” before filtering again incubation studies with soil or medium and being sorted by type of PyOM, number of PyOM temperatures, characterization of char beyond elemental composition, and length of incubation.

Table S1. Web of science query results, unfiltered for isotopes, soil, chemical characterization or PyOM type.

Title	Authors	Source Title	Publication Year	Volume
Investigation of growth responses in saprophytic fungi to charred biomass	Ascough, Philippa L.; Sturrock, Craig J.; Bird, Michael I.	ISOTOPES IN ENVIRONMENTAL AND HEALTH STUDIES	2010	46
Kinetic study of time-dependent fixation of U-VI on biochar	Ashry, A.; Bailey, E. H.; Chenery, S. R. N.; Young, S. D.	JOURNAL OF HAZARDOUS MATERIALS	2016	320
Wood biochar increases nitrogen retention in field settings mainly through abiotic processes	Bai, Shahla Hosseini; Reverchon, Frederique; Xu, Cheng-Yuan; Xu, Zhihong; Blumfield, Timothy J.; Zhao, Haitao; Van Zwieten, Lukas; Wallace, Helen M.	SOIL BIOLOGY & BIOCHEMISTRY	2015	90
Soil and foliar nutrient and nitrogen isotope composition (delta N-15) at 5 years after poultry litter and green waste biochar amendment in a macadamia orchard	Bai, Shahla Hosseini; Xu, Cheng-Yuan; Xu, Zhihong; Blumfield, Timothy J.; Zhao, Haitao; Wallace, Helen; Reverchon, Frederique; Van Zwieten, Lukas	ENVIRONMENTAL SCIENCE AND POLLUTION RESEARCH	2015	22
Isotopes in pyrogenic carbon: A review	Bird, Michael I.; Ascough, Philippa L.	ORGANIC GEOCHEMISTRY	2012	42
X-ray microtomographic imaging of charcoal	Bird, Michael I.; Ascough, Philippa L.; Young, Iain M.; Wood, Cheryl V.; Scott, Andrew C.	JOURNAL OF ARCHAEOLOGICAL SCIENCE	2008	35

Loss and gain of carbon during char degradation	Bird, Michael I.; McBeath, Anna V.; Ascough, Philippa L.; Levchenko, Vladimir A.; Wurster, Christopher M.; Munksgaard, Niels C.; Smernik, Ronald J.; Williams, Alan	SOIL BIOLOGY & BIOCHEMISTRY	2017	106
The Pyrogenic Carbon Cycle	Bird, Michael I.; Wynn, Jonathan G.; Saiz, Gustavo; Wurster, Christopher M.; McBeath, Anna	ANNUAL REVIEW OF EARTH AND PLANETARY SCIENCES, VOL 43	2015	43
Activated Carbon and Biochar Reduce Mercury Methylation Potentials in Aquatic Sediments	Bussan, Derek D.; Sessums, Ryan F.; Cizdziel, James V.	BULLETIN OF ENVIRONMENTAL CONTAMINATION AND TOXICOLOGY	2016	96
Elucidating the chemical structure of pyrogenic organic matter by combining magnetic resonance, mid-infrared spectroscopy and mass spectrometry	Chatterjee, Subhasish; Santos, Fernanda; Abiven, Samuel; Itin, Boris; Stark, Ruth E.; Bird, Jeffrey A.	ORGANIC GEOCHEMISTRY	2012	51
Fate of nitrogen in overlying water with biochar addition to sediment in planted ditches	Cheng, Qianding; Cheng, Hongguang; Lu, Lu; Pu, Xiao; Wu, Zhenzhen; Sun, Haixu	ENVIRONMENTAL SCIENCE-PROCESSES & IMPACTS	2018	20
Carbon Sequestration and Fertility after Centennial Time Scale Incorporation of Charcoal into Soil	Criscuoli, Irene; Alberti, Giorgio; Baronti, Silvia; Favilli, Filippo; Martinez, Cristina; Calzolari, Costanza; Pusceddu, Emanuela; Rumpel, Cornelia; Viola, Roberto; Miglietta, Franco	PLOS ONE	2014	9

Interactions between biochar and litter priming: A three-source C-14 and delta C-13 partitioning study	Cui, Jun; Ge, Tida; Kuzyakov, Yakov; Nie, Ming; Fang, Changming; Tang, Boping; Zhou, Chunlin	SOIL BIOLOGY & BIOCHEMISTRY	2017	104
Bacterial Community Composition Associated with Pyrogenic Organic Matter (Biochar) Varies with Pyrolysis Temperature and Colonization Environment	Dai, Zhongmin; Barberan, Albert; Li, Yong; Brookes, Philip C.; Xu, Jianming	MSPHERE	2017	2
Sensitive responders among bacterial and fungal microbiome to pyrogenic organic matter (biochar) addition differed greatly between rhizosphere and bulk soils	Dai, Zhongmin; Hu, Jiajie; Xu, Xingkun; Zhang, Lujun; Brookes, Philip C.; He, Yan; Xu, Jianming	SCIENTIFIC REPORTS	2016	6
Bioavailability of N released from N-rich pyrogenic organic matter: An incubation study	de la Rosa, Jose M.; Knicker, Heike	SOIL BIOLOGY & BIOCHEMISTRY	2011	43
Soil-borne fungi challenge the concept of long-term biochemical recalcitrance of pyrochar	De la Rosa, Jose M.; Miller, Ana Z.; Knicker, Heike	SCIENTIFIC REPORTS	2018	8
Organic carbon dynamics in soils with pyrogenic organic matter that received plant residue additions over seven years	Dharmakeerthi, R. Saman; Hanley, Kelly; Whitman, Thea; Woolf, Dominic; Lehmann, Johannes	SOIL BIOLOGY & BIOCHEMISTRY	2015	88
Discharge of dissolved black carbon from a fire-affected intertidal system	Dittmar, Thorsten; Paeng, Jiyoung; Gihring, Thomas M.; Suryaputra, I. G. N. A.; Huettel, Markus	LIMNOLOGY AND OCEANOGRAPHY	2012	57
From 1-D coordination polymers to 3-D hydrogen-bonding networks: Crystal engineering and magnetism of Cu-II-dca-cyanopyridine supramolecular systems (dca = dicyanamide, N(CN)(2)(-))	Du, M; Zhao, XJ; Batten, SR; Ribas, J	CRYSTAL GROWTH & DESIGN	2005	5

Metal dicyanamide layered coordination polymers with cyanopyridine co-ligands: Synthesis, crystal structures and magnetism	Du, Miao; Wang, Qian; Wang, Ying; Zhao, Xiao-Jun; Ribas, Joan	JOURNAL OF SOLID STATE CHEMISTRY	2006	179
Nano-structural and chemical characterization of charred organic matter in a fire-affected Arenosol	Filimonova, Svetlana; Hilscher, Andre; Koegel-Knabner, Ingrid	GEODERMA	2014	232
Weathering of pyrogenic organic matter induces fungal oxidative enzyme response in single culture inoculation experiments	Gibson, Christy; Berry, Timothy D.; Wang, Ruzhen; Spencer, Julie A.; Johnston, Cliff T.; Jiang, Yong; Bird, Jeffrey A.; Filley, Timothy R.	ORGANIC GEOCHEMISTRY	2016	92
Tree taxa and pyrolysis temperature interact to control pyrogenic organic matter induced native soil organic carbon priming	Gibson, Christy; Hatton, Pierre-Joseph; Bird, Jeffrey A.; Nadelhoffer, Knute; Le Moine, Jim; Filley, Timothy	SOIL BIOLOGY & BIOCHEMISTRY	2018	119
Stability of pyrochar and hydrochar in agricultural soil - a new field incubation method	Gronwald, Marco; Vos, Cora; Helfrich, Mirjam; Don, Axel	GEODERMA	2016	284
A preliminary assessment on the use of biochar as a soil additive for reducing soil-to-plant uptake of cesium isotopes in radioactively contaminated environments	Hamilton, Terry F.; Martinelli, Roger E.; Kehl, Steven R.; Hayes, Michael H. B.; Smith, Iris J.; Peters, Sandra K. G.; Tamblin, Michael W.; Schmitt, Cindi L.; Hawk, Daniel	JOURNAL OF RADIOANALYTICAL AND NUCLEAR CHEMISTRY	2016	307
Discrimination in Degradability of Soil Pyrogenic Organic Matter Follows a Return-On-Energy-Investment Principle	Harvey, Omar R.; Myers-Pigg, Allison N.; Kuo, Li-Jung; Singh, Bhupinder Pal; Kuehn, Kevin A.; Louchouarn, Patrick	ENVIRONMENTAL SCIENCE & TECHNOLOGY	2016	50

Tree taxa and pyrolysis temperature interact to control the efficacy of pyrogenic organic matter formation	Hatton, Pierre-Joseph; Chatterjee, Subhasish; Filley, Timothy R.; Dastmalchi, Keyvan; Plante, Alain F.; Abiven, Samuel; Gao, Xiaodong; Masiello, Caroline A.; Leavitt, Steven W.; Nadelhoffer, Knute J.; Stark, Ruth E.; Bird, Jeffrey A.	BIOGEOCHEMISTRY	2016	130
Long-term effect of biochar on the stabilization of recent carbon: soils with historical inputs of charcoal	Hernandez-Soriano, Maria C.; Kerre, Bart; Goos, Peter; Hardy, Brieuc; Dufey, Joseph; Smolders, Erik	GLOBAL CHANGE BIOLOGY BIOENERGY	2016	8
Quantitative Determination of PAHs in Biochar: A Prerequisite To Ensure Its Quality and Safe Application	Hilber, Isabel; Blum, Franziska; Leifeld, Jens; Schmidt, Hans-Peter; Bucheli, Thomas D.	JOURNAL OF AGRICULTURAL AND FOOD CHEMISTRY	2012	60
Mineralisation and structural changes during the initial phase of microbial degradation of pyrogenic plant residues in soil	Hilscher, Andre; Heister, Katja; Siewert, Christian; Knicker, Heike	ORGANIC GEOCHEMISTRY	2009	40
Carbon and nitrogen degradation on molecular scale of grass-derived pyrogenic organic material during 28 months of incubation in soil	Hilscher, Andre; Knicker, Heike	SOIL BIOLOGY & BIOCHEMISTRY	2011	43
Degradation of grass-derived pyrogenic organic material, transport of the residues within a soil column and distribution in soil organic matter fractions during a 28 month microcosm experiment	Hilscher, Andre; Knicker, Heike	ORGANIC GEOCHEMISTRY	2011	42
Wheat straw and its biochar had contrasting effects on soil C and N cycling two growing seasons after addition to a Black Chernozemic soil planted to barley	Hu, Ya-Lin; Wu, Feng-Ping; Zeng, De-Hui; Chang, Scott X.	BIOLOGY AND FERTILITY OF SOILS	2014	50

Soil organic carbon contents as a result of various organic amendments to a vertisol	Hua, Keke; Wang, Daozhong; Guo, Zhibin	NUTRIENT CYCLING IN AGROECOSYSTEMS	2017	108
Charcoal reflectance suggests heating duration and fuel moisture affected burn severity in four Alaskan tundra wildfires	Hudspith, Victoria A.; Belcher, Claire M.; Barnes, Jennifer; Dash, Carolyn B.; Kelly, Ryan; Hu, Feng Sheng	INTERNATIONAL JOURNAL OF WILDLAND FIRE	2017	26
Initial biochar effects on plant productivity derive from N fertilization	Jeffery, Simon; Memelink, Ilse; Hodgson, Edward; Jones, Sian; van de Voorde, Tess F. J.; Bezemer, T. Martijn; Mommer, Liesje; van Groenigen, Jan Willem	PLANT AND SOIL	2017	415
Controls and dynamics of biochar decomposition and soil microbial abundance, composition, and carbon use efficiency during long-term biochar-amended soil incubations	Jiang, Xinyu; Denef, Karolien; Stewart, Catherine E.; Cotrufo, M. Francesca	BIOLOGY AND FERTILITY OF SOILS	2016	52
Characterization and Phenanthrene Sorption of Natural and Pyrogenic Organic Matter Fractions	Jin, Jie; Sun, Ke; Wang, Ziying; Yang, Yan; Han, Lanfang; Xing, Baoshan	ENVIRONMENTAL SCIENCE & TECHNOLOGY	2017	51
Spatial variation of soil macrofauna and nutrients in tropical agricultural systems influenced by historical charcoal production in South Nandi, Kenya	Kamau, Solomon; Barrios, Edmundo; Karanja, Nancy K.; Ayuke, Fredrick O.; Lehmann, Johannes	APPLIED SOIL ECOLOGY	2017	119
Partitioning of carbon sources among functional pools to investigate short-term priming effects of biochar in soil: A C-13 study	Kerre, Bart; Hernandez-Soriano, Maria C.; Smolders, Erik	SCIENCE OF THE TOTAL ENVIRONMENT	2016	547
Temperature resolved alteration of soil organic matter composition during laboratory heating as revealed by C and N XANES spectroscopy and Py-FIMS	Kiersch, Kristian; Kruse, Jens; Regier, Thomas Z.; Leinweber, Peter	THERMOCHIMICA ACTA	2012	537

Modification of biomarkers in pyrogenic organic matter during the initial phase of charcoal biodegradation in soils	Knicker, H.; Hilscher, A.; de la Rosa, J. M.; Gonzalez-Perez, J. A.; Gonzalez-Vila, F. J.	GEODERMA	2013	197
Alteration of quality and stability of organic matter in grassland soils of Southern Brazil highlands after ceasing biannual burning	Knicker, H.; Nikolova, R.; Dick, D. P.; Dalmolin, R. S. D.	GEODERMA	2012	181
Pyrogenic organic matter in soil: Its origin and occurrence, its chemistry and survival in soil environments	Knicker, Heike	QUATERNARY INTERNATIONAL	2011	243
Black nitrogen - an important fraction in determining the recalcitrance of charcoal	Knicker, Heike	ORGANIC GEOCHEMISTRY	2010	41
Biodegradability of organic matter in fire-affected mineral soils of Southern Spain	Knicker, Heike; Gonzalez-Vila, Francisco J.; Gonzalez-Vazquez, Rocio	SOIL BIOLOGY & BIOCHEMISTRY	2013	56
A new conceptual model for the structural properties of char produced during vegetation fires	Knicker, Heike; Hilscher, Andre; Gonzalez-Vila, Francisco J.; Almendros, Gonzalo	ORGANIC GEOCHEMISTRY	2008	39
Soil chemical properties and organic matter composition of a subtropical Cambisol after charcoal fine residues incorporation	Leal, Otavio dos Anjos; Dick, Deborah Pinheiro; Lombardi, Katia Cylene; Maciel, Vanessa Goncalves; Antonio Gonzalez-Perez, Jose; Knicker, Heike	JOURNAL OF SOILS AND SEDIMENTS	2015	15
The addition of retorted oil shale increases carbon retention of plant residues in the soil	Leao, Ricardo Elso; Giacomini, Sandro Jose; Redin, Marciel; Souza, Eduardo Lorensi; Posser Silveira, Carlos Augusto	PESQUISA AGROPECUARIA BRASILEIRA	2014	49

The influence of lignocellulose and hemicellulose biochar on photosynthesis and water use efficiency in seedlings from a Northeastern US pine-oak ecosystem	Licht, Jeff; Smith, Nicholas	JOURNAL OF SUSTAINABLE FORESTRY	2018	37
Effects of Different Biochars on Pinus elliottii Growth, N Use Efficiency, Soil N2O and CH4 Emissions and C Storage in a Subtropical Area of China	Lin Zhibin; Liu Qi; Liu Gang; Cowie, Annette L.; Bei Qicheng; Liu Benjuan; Wang Xiaojie; Ma Jing; Zhu Jianguo; Xie Zubin	PEDOSPHERE	2017	27
Effects of biochar application on greenhouse gas emissions, carbon sequestration and crop growth in coastal saline soil	Lin, X. W.; Xie, Z. B.; Zheng, J. Y.; Liu, Q.; Bei, Q. C.; Zhu, J. G.	EUROPEAN JOURNAL OF SOIL SCIENCE	2015	66
Biochar amendments increase the yield advantage of legume-based intercropping systems over monoculture	Liu, Ling; Wang, Yanfang; Yan, Xinwei; Li, Jiwei; Jiao, Nianyuan; Hu, Shuijin	AGRICULTURE ECOSYSTEMS & ENVIRONMENT	2017	237
Transformation and Transport Mechanism of Nitrogenous Compounds in a Biochar Preparation-Returning to the Field Process Studied by Employing an Isotope Tracer Method	Liu, Liyun; Tan, Zhongxin; Ye, Zhixiong	ACS SUSTAINABLE CHEMISTRY & ENGINEERING	2018	6
Maize stover biochar increases urea (N-15 isotope) retention in soils but does not promote its acquisition by plants during a 4-year pot experiment	Liu, Zunqi; Cheng, Xiaoyi; Sun, Daquan; Meng, Jun; Chen, Wenfu	CHILEAN JOURNAL OF AGRICULTURAL RESEARCH	2017	77
Incorporation of N from burnt and unburnt N-15 grass residues into the peptidic fraction of fire affected and unaffected soils	Lopez-Martin, Maria; Nowak, Karolina M.; Miltner, Anja; Knicker, Heike	JOURNAL OF SOILS AND SEDIMENTS	2017	17
Biochar suppressed the decomposition of organic carbon in a cultivated sandy loam soil: A negative priming effect	Lu, Weiwei; Ding, Weixin; Zhang, Junhua; Li, Yi; Luo, Jiafa; Bolan, Nanthi; Xie, Zubin	SOIL BIOLOGY & BIOCHEMISTRY	2014	76

Nitrogen Amendment Stimulated Decomposition of Maize Straw-Derived Biochar in a Sandy Loam Soil: A Short-Term Study	Lu, Weiwei; Ding, Weixin; Zhang, Junhua; Zhang, Huanjun; Luo, Jiafa; Bolan, Nanthi	PLOS ONE	2015	10
Response of biochar induced carbon mineralization priming effects to additional nitrogen in a sandy loam soil	Lu, Weiwei; Zhang, Hailin	APPLIED SOIL ECOLOGY	2015	96
Priming effects in biochar enriched soils using a three-source-partitioning approach: C-14 labelling and C-13 natural abundance	Luo, Yu; Zang, Huadong; Yu, Zhuyun; Chen, Zhiyi; Gunina, Anna; Kuzyakov, Yakov; Xu, Jianming; Zhang, Kaile; Brookes, Philip C.	SOIL BIOLOGY & BIOCHEMISTRY	2017	106
Carbon losses from pyrolysed and original wood in a forest soil under natural and increased N deposition	Maestrini, B.; Abiven, S.; Singh, N.; Bird, J.; Torn, M. S.; Schmidt, M. W. I.	BIOGEOSCIENCES	2014	11
Ryegrass-derived pyrogenic organic matter changes organic carbon and nitrogen mineralization in a temperate forest soil	Maestrini, Bernardo; Herrmann, Anke M.; Nannipieri, Paolo; Schmidt, Michael W. I.; Abiven, Samuel	SOIL BIOLOGY & BIOCHEMISTRY	2014	69
A meta-analysis on pyrogenic organic matter induced priming effect	Maestrini, Bernardo; Nannipieri, Paolo; Abiven, Samuel	GLOBAL CHANGE BIOLOGY BIOENERGY	2015	7
Prescribed Fire Alters Dissolved Organic Matter and Disinfection By-Product Precursors in Forested Watersheds - Part I. A Controlled Laboratory Study	Majidzadeh, Hamed; Wang, Jun-Jian; Chow, Alex T.	RECENT ADVANCES IN DISINFECTION BY-PRODUCTS	2015	1190
Fate of soil-applied black carbon: downward migration, leaching and soil respiration	Major, Julie; Lehmann, Johannes; Rondon, Marco; Goodale, Christine	GLOBAL CHANGE BIOLOGY	2010	16

Carbon sequestration potential of hydrothermal carbonization char (hydrochar) in two contrasting soils; results of a 1-year field study	Malghani, Saadatullah; Jueschke, Elisabeth; Baumert, Julia; Thuille, Angelika; Antonietti, Markus; Trumbore, Susan; Gleixner, Gerd	BIOLOGY AND FERTILITY OF SOILS	2015	51
Effects of fire on soil organic matter quality along an altitudinal sequence on Mt. Etna, Sicily	Mastrolonardo, Giovanni; Certini, Giacomo; Krebs, Rolf; Forte, Claudia; Egli, Markus	CATENA	2013	110
Soil pyrogenic organic matter characterisation by spectroscopic analysis: a study on combustion and pyrolysis residues	Mastrolonardo, Giovanni; Francioso, Ornella; Di Foggia, Michele; Bonora, Sergio; Forte, Claudia; Certini, Giacomo	JOURNAL OF SOILS AND SEDIMENTS	2015	15
Biochar application rate affects biological nitrogen fixation in red clover conditional on potassium availability	Mia, S.; van Groenigen, J. W.; van de Voorde, T. F. J.; Oram, N. J.; Bezemer, T. M.; Mommer, L.; Jeffery, S.	AGRICULTURE ECOSYSTEMS & E++++++++NVIRONMENT	2014	191
The stability of low- and high-ash biochars in acidic soils of contrasting mineralogy	Murray, James; Keith, Alexandra; Singh, Balwant	SOIL BIOLOGY & BIOCHEMISTRY	2015	89
Vertical and lateral transport of biochar in light-textured tropical soils	Obia, Alfred; Borresen, Trond; Martinsen, Vegard; Cornelissen, Gerard; Mulder, Jan	SOIL & TILLAGE RESEARCH	2017	165
A multi-technique approach to assess the fate of biochar in soil and to quantify its effect on soil organic matter composition	Paetsch, Lydia; Mueller, Carsten W.; Rumpel, Cornelia; Angst, Sarka; Wiesheu, Alexandra C.; Girardin, Cyril; Ivleva, Natalia P.; Niessner, Reinhard; Koegel-Knabner, Ingrid	ORGANIC GEOCHEMISTRY	2017	112

Response of different soil organic matter pools to biochar and organic fertilizers	Plaza, Cesar; Giannetta, Beatrice; Fernandez, Jose M.; Lopez-de-Sa, Esther G.; Polo, Alfredo; Gasco, Gabriel; Mendez, Ana; Zaccone, Claudio	AGRICULTURE ECOSYSTEMS & ENVIRONMENT	2016	225
CARBON OCCLUSION POTENTIAL OF RICE PHYTOLITHS: IMPLICATIONS FOR GLOBAL CARBON CYCLE AND CLIMATE CHANGE MITIGATION	Prajapati, K.; Rajendiran, S.; Coumar, Vassanda M.; Dotaniya, M. L.; Ajay-Kundu, S.; Saha, J. K.; Patra, A. K.	APPLIED ECOLOGY AND ENVIRONMENTAL RESEARCH	2016	14
Chemical and Isotopic Thresholds in Charring: Implications for the Interpretation of Charcoal Mass and Isotopic Data	Pyle, Lacey A.; Hockaday, William C.; Boutton, Thomas; Zygourakis, Kyriacos; Kinney, Timothy J.; Masiello, Caroline A.	ENVIRONMENTAL SCIENCE & TECHNOLOGY	2015	49
Changes in biochar physical and chemical properties: Accelerated biochar aging in an acidic soil	Rechberger, Maria V.; Kloss, Stefanie; Rennhofer, Harald; Tintner, Johannes; Watzinger, Andrea; Soja, Gerhard; Lichtenegger, Helga; Zehetner, Franz	CARBON	2017	115
Changes in delta N-15 in a soil-plant system under different biochar feedstocks and application rates	Reverchon, Frederique; Flicker, Robert C.; Yang, Hong; Yan, Guijun; Xu, Zhihong; Chen, Chengrong; Bai, Shahla Hosseini; Zhang, Dongke	BIOLOGY AND FERTILITY OF SOILS	2014	50
A preliminary assessment of the potential of using an acacia-biochar system for spent mine site rehabilitation	Reverchon, Frederique; Yang, Hong; Ho, Thian Yuan; Yan, Guijun; Wang, Jian; Xu, Zhihong; Chen, Chengrong; Zhang, Dongke	ENVIRONMENTAL SCIENCE AND POLLUTION RESEARCH	2015	22

Molecular characterization of the thermally labile fraction of biochar by hydropyrolysis and pyrolysis-GC/MS	Rombola, Alessandro G.; Fabbri, Daniele; Meredith, Will; Snape, Colin E.; Dieguez-Alonso, Alba	JOURNAL OF ANALYTICAL AND APPLIED PYROLYSIS	2016	121
Biological nitrogen fixation by common beans (Phaseolus vulgaris L.) increases with bio-char additions	Rondon, Marco A.; Lehmann, Johannes; Ramirez, Juan; Hurtado, Maria	BIOLOGY AND FERTILITY OF SOILS	2007	43
Emission of CO2 from biochar-amended soils and implications for soil organic carbon	Sagrilo, Edvaldo; Jeffery, Simon; Hoffland, Ellis; Kuyper, Thomas W.	GLOBAL CHANGE BIOLOGY BIOENERGY	2015	7
Forest floor chemical transformations in a boreal forest fire and their correlations with temperature and heating duration	Santin, Cristina; Doerr, Stefan H.; Merino, Agustin; Bryant, Robert; Loader, Neil J.	GEODERMA	2016	264
Pyrogenic organic matter production from wildfires: a missing sink in the global carbon cycle	Santin, Cristina; Doerr, Stefan H.; Preston, Caroline M.; Gonzalez-Rodriguez, Gil	GLOBAL CHANGE BIOLOGY	2015	21
Biological degradation of pyrogenic organic matter in temperate forest soils	Santos, Fernanda; Torn, Margaret S.; Bird, Jeffrey A.	SOIL BIOLOGY & BIOCHEMISTRY	2012	51
Degradation of Miscanthus x giganteus biochar, hydrochar and feedstock under the influence of disturbance events	Schimmelpfennig, Sonja; Kammann, Claudia; Murnme, Jan; Marhan, Sven; Bamminger, Chris; Moser, Gerald; Mueller, Christoph	APPLIED SOIL ECOLOGY	2017	113
'Bioenergy from cattle manure? Implications of anaerobic digestion and subsequent pyrolysis for carbon and nitrogen dynamics in soil'	Schouten, Socrates; van Groenigen, Jan W.; Oenema, Oene; Cayuela, Maria L.	GLOBAL CHANGE BIOLOGY BIOENERGY	2012	4

Transformation and stabilization of pyrogenic organic matter in a temperate forest field experiment	Singh, Nimisha; Abiven, Samuel; Maestrini, Bernardo; Bird, Jeffrey A.; Torn, Margaret S.; Schmidt, Michael W. I.	GLOBAL CHANGE BIOLOGY	2014	20
Below-ground biological responses to pyrogenic organic matter and litter inputs in grasslands	Soong, Jennifer L.; Dam, Marie; Wall, Diana H.; Cotrufo, M. Francesca	FUNCTIONAL ECOLOGY	2017	31
Co-generated fast pyrolysis biochar mitigates green-house gas emissions and increases carbon sequestration in temperate soils	Stewart, Catherine E.; Zheng, Jiyong; Botte, Jorin; Cotrufo, M. Francesca	GLOBAL CHANGE BIOLOGY BIOENERGY	2013	5
Biochar adsorbed ammonia is bioavailable	Taghizadeh-Toosi, Arezoo; Clough, Tim J.; Sherlock, Robert R.; Condron, Leo M.	PLANT AND SOIL	2012	350
A wood based low-temperature biochar captures NH3-N generated from ruminant urine-N, retaining its bioavailability	Taghizadeh-Toosi, Arezoo; Clough, Tim J.; Sherlock, Robert R.; Condron, Leo M.	PLANT AND SOIL	2012	353
Transformation of chlorpyrifos in integrated recirculating constructed wetlands (IRCWs) as revealed by compound-specific stable isotope (CSIA) and microbial community structure analysis	Tang, Xiaoyan; Yang, Yang; Huang, Wenda; McBride, Murray B.; Guo, Jingjing; Tao, Ran; Dai, Yunv	BIORESOURCE TECHNOLOGY	2017	233
Short-term effects of organo-mineral biochar and organic fertilisers on nitrogen cycling, plant photosynthesis, and nitrogen use efficiency	Thi Thu Nhan Nguyen; Wallace, Helen M.; Xu, Cheng-Yuan; Xu, Zhihong; Farrar, Michael B.; Joseph, Stephen; Van Zwieten, Lukas; Bai, Shahla Hosseini	JOURNAL OF SOILS AND SEDIMENTS	2017	17

Pyrolysing poultry litter reduces N2O and CO2 fluxes	Van Zwieten, L.; Kimber, S. W. L.; Morris, S. G.; Singh, B. P.; Grace, P. R.; Scheer, C.; Rust, J.; Downie, A. E.; Cowie, A. L.	SCIENCE OF THE TOTAL ENVIRONMENT	2013	465
Enhanced biological N-2 fixation and yield of faba bean (Vicia faba L.) in an acid soil following biochar addition: dissection of causal mechanisms	Van Zwieten, Lukas; Rose, Terry; Herridge, David; Kimber, Stephen; Rust, Josh; Cowie, Annette; Morris, Stephen	PLANT AND SOIL	2015	395
Biochemically altered charcoal residues as an important source of soil organic matter in subsoils of fire-affected subtropical regions	Velasco-Molina, Marta; Berns, Anne E.; Macias, Felipe; Knicker, Heike	GEODERMA	2016	262
Biochar mineralization and priming effect on SOM decomposition in two European short rotation coppices	Ventura, Maurizio; Alberti, Giorgio; Viger, Maud; Jenkins, Joseph R.; Girardin, Cyril; Baronti, Silvia; Zaldei, Alessandro; Taylor, Gail; Rumpel, Cornelia; Miglietta, Franco; Tonon, Giustino	GLOBAL CHANGE BIOLOGY BIOENERGY	2015	7
Impact of biochar amendment on soil water soluble carbon in the context of extreme hydrological events	Wang, Daoyuan; Griffin, Deirdre E.; Parikh, Sanjai J.; Scow, Kate M.	CHEMOSPHERE	2016	160
Biochar stability in soil: meta-analysis of decomposition and priming effects	Wang, Jinyang; Xiong, Zhengqin; Kuzyakov, Yakov	GLOBAL CHANGE BIOLOGY BIOENERGY	2016	8
Photooxidation of pyrogenic organic matter reduces its reactive, labile C pool and the apparent soil oxidative microbial enzyme response	Wang, Ruzhen; Gibson, Christy D.; Berry, Timothy D.; Jiang, Yong; Bird, Jeffrey A.; Filley, Timothy R.	GEODERMA	2017	293

Changes in soil chemical properties as affected by pyrogenic organic matter amendment with different intensity and frequency	Wang, Ruzhen; Zhang, Yulan; Cerda, Artemi; Cao, Mingming; Zhang, Yongyong; Yin, Jinfei; Jiang, Yong; Chen, Lijun	GEODERMA	2017	289
Biochar nutrient availability rather than its water holding capacity governs the growth of both C3 and C4 plants	Wang, Yuzhe; Zhang, Lianwei; Yang, Hong; Yan, Guijun; Xu, Zhihong; Chen, Chengrong; Zhang, Dongke	JOURNAL OF SOILS AND SEDIMENTS	2016	16
Char Amendments Impact Soil Nitrous Oxide Production during Ammonia Oxidation	Wells, Naomi S.; Baggs, Elizabeth M.	SOIL SCIENCE SOCIETY OF AMERICA JOURNAL	2014	78
Plant-biochar interactions drive the negative priming of soil organic carbon in an annual ryegrass field system	Weng, Zhe (Han); Van Zwieten, Lukas; Singh, Bhupinder Pal; Kimber, Stephen; Morris, Stephen; Cowie, Annette; Macdonald, Lynne M.	SOIL BIOLOGY & BIOCHEMISTRY	2015	90
Pyrogenic carbon additions to soil counteract positive priming of soil carbon mineralization by plants	Whitman, Thea; Enders, Akio; Lehmann, Johannes	SOIL BIOLOGY & BIOCHEMISTRY	2014	73
A dual-isotope approach to allow conclusive partitioning between three sources	Whitman, Thea; Lehmann, Johannes	NATURE COMMUNICATIONS	2015	6
Dynamics of microbial community composition and soil organic carbon mineralization in soil following addition of pyrogenic and fresh organic matter	Whitman, Thea; Pepe-Ranney, Charles; Enders, Akio; Koechli, Chantal; Campbell, Ashley; Buckley, Daniel H.; Lehmann, Johannes	ISME JOURNAL	2016	10

Carbon Mineralizability Determines Interactive Effects on Mineralization of Pyrogenic Organic Matter and Soil Organic Carbon	Whitman, Thea; Zhu, Zihua; Lehmann, Johannes	ENVIRONMENTAL SCIENCE & TECHNOLOGY	2014	48
Pyrogenic molecular markers: Linking PAH with BPCA analysis	Wiedemeier, Daniel B.; Brodowski, Sonja; Wiesenberg, Guido L. B.	CHEMOSPHERE	2015	119
Pyrogenic molecular markers: Linking PAH with BPCA analysis	Wiedemeier, Daniel B.; Brodowski, Sonja; Wiesenberg, Guido L. B.	CHEMOSPHERE	2015	119
Depletion of soil organic carbon and nitrogen under Pinus taeda plantations in Southern Brazilian grasslands (Campos)	Wiesmeier, M.; Dick, D. P.; Rumpel, C.; Dalmolin, R. S. D.; Hilscher, A.; Knicker, H.	EUROPEAN JOURNAL OF SOIL SCIENCE	2009	60
Microbial mineralization of pyrogenic organic matter in different mineral systems	Woo, Seung H.; Enders, Akio; Lehmann, Johannes	ORGANIC GEOCHEMISTRY	2016	98
Peanut shell biochar improves soil properties and peanut kernel quality on a red Ferrosol	Xu, Cheng-Yuan; Bai, Shahla Hosseini; Hao, Yanbin; Rachaputi, Rao C. N.; Xu, Zhihong; Wallace, Helen M.	JOURNAL OF SOILS AND SEDIMENTS	2015	15
Characterizing the Effects of Biologically Active Covers on Landfill Methane Emission Flux and Bio-Oxidation	Yang, Ting; Sun, Wenjie; Yue, Dongbei	JOURNAL OF ENVIRONMENTAL ENGINEERING	2017	143
Stable isotopic analysis of pyrogenic organic matter in soils by liquid chromatography-isotope-ratio mass spectrometry of benzene polycarboxylic acids	Yarnes, Christopher; Santos, Fernanda; Singh, Nimisha; Abiven, Samuel; Schmidt, Michael W. I.; Bird, Jeffrey A.	RAPID COMMUNICATIONS IN MASS SPECTROMETRY	2011	25

Investigating the biochar effects on C-mineralization and sequestration of carbon in soil compared with conventional amendments using the stable isotope (delta C-13) approach	Yousaf, Balal; Liu, Guijian; Wang, Ruwei; Abbas, Qumber; Imtiaz, Muhammad; Liu, Ruijia	GLOBAL CHANGE BIOLOGY BIOENERGY	2017	9
Interactive effects of biochar addition and elevated carbon dioxide concentration on soil carbon and nitrogen pools in mine spoil	Zhang, Yaling; Chen, Hong; Bai, Shahla Hosseini; Menke, Carl; Zhang, Manyun; Xu, Zhihong	JOURNAL OF SOILS AND SEDIMENTS	2017	17
Assessing the potential of using biochar in mine rehabilitation under elevated atmospheric CO2 concentration	Zhang, Yaling; Menke, Carl; Drigo, Barbara; Bai, Shahla Hosseini; Anderson, Ian; Xu, Zhihong; Chen, Hong; Zhang, Manyun	JOURNAL OF SOILS AND SEDIMENTS	2017	17
Electron Shuttles Enhance Anaerobic Ammonium Oxidation Coupled to Iron(III) Reduction	Zhou, Guo-Wei; Yang, Xiao-Ru; Li, Hu; Marshall, Christopher W.; Zheng, Bang-Xiao; Yan, Yu; Su, Jian-Qiang; Zhu, Yong-Guan	ENVIRONMENTAL SCIENCE & TECHNOLOGY	2016	50
Trial by Fire: On the Terminology and Methods Used in Pyrogenic Organic Carbon Research	Zimmerman, Andrew R.; Mitra, Siddhartha	FRONTIERS IN EARTH SCIENCE	2017	5

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Table S2. %Contribution of fast cycling PyOM ($PyOM_f$), slow cycling PyOM ($PyOM_s$), and leachable wood and PyOM ($PyOM_w$) to net PyOM mineralization.

Treatment	% $PyOM_f$ of Net PyOM mineralized		% $PyOM_s$ of Net PyOM mineralized		% PyOMw of Net PyOM mineralized	
JP T000	41.9	*12.5*	68.0	*5.4*	14.1	*2.4*
JP T200	20.6	*9.1*	75.4	*7.5*	18.6	*7.1*
JP T300	14.0	*3.0*	64.8	*9.6*	37.4	*7.1*
JP T450	34.3	*4.4*	73.6	*6.1*	54.0	*4.4*
JP T600	23.7	*4.7*	72.4	*9.7*	64.9	*15.7*
RM T000	19.9	*1.8*	85.8	*0.6*	24.3	*1.0*
RM T200	13.1	*1.9*	85.1	*1.3*	23.9	*2.3*
RM T300	13.1	*1.5*	87.7	*1.4*	29.9	*3.1*
RM T450	44.8	*6.2*	58.2	*4.6*	54.5	*7.9*
RM T600	53.8	*22.4*	51.5	*16.8*	84.0	*4.4*

Table S3. Pearson Correlation coefficients of tested parameters for (a) jack pine (JP) and (b) red maple (RM) wood and PyOM treatments. Asterisks indicated significant relationships ($\alpha = 0.05$).

a. Jack Pine	Total PyOM mineralized (mg C g^{-1} added C)	Cf (mg C g^{-1} added C)	Cs (mg C g^{-1} added C)	MRT_f (days)	MRT_s (years)	BET - N2 surface area (m^2 g^{-1})	%Long Chain Aliphatics	% Non - lignin phenols	%Carbohydrates	Recalictrance Index (R50)	Specific UV absorption (254nm)	$PyOM_w$ (mg C)	Energy density (J mg^{-1} C)
Total PyC mineralized (mg C g^{-1} added C)	1.00												
Cf (mg C g^{-1} added C)	0.95*	1.00											
Cs (mg C g^{-1} added C)	1.00*	0.92*	1.00										
MRT_f (days)	0.86	0.82	0.85	1.00									
MRT_s (years)	-0.71	-0.57	-0.73	-0.92*	1.00								
BET - N2 surface area (m^2 g^{-1})	-0.43	-0.34	-0.44	-0.62	0.72	1.00							
%Long Chain Aliphatics	0.10	0.06	0.10	0.57	-0.71	-0.73	1.00						
% Non - lignin phenols	0.95*	0.81	0.97*	0.85	-0.81	-0.42	0.18	1.00					
%Carbohydrates	0.88	0.68	0.91*	0.77	-0.83	-0.56	0.23	0.96*	1.00				
(Recalictrance Index (R50)	-0.91	-0.74	-0.93	-0.86	0.89	0.62	-0.34	-0.97*	-0.99*	1.00			
Specific UV absorption (254nm)	-0.78	-0.68	-0.78	-0.97*	0.98*	0.74	-0.69	-0.82	-0.81	0.89	1.00		

$PyOM_w$ (mg C)	1.00*	0.94*	0.99*	0.90	-0.77	-0.47	0.18	0.96	0.89	-0.92*	-0.83	1.00	
Energy density (J mg $^{-1}$ C)	-0.89	-0.69	-0.92*	-0.73	0.77	0.45	-0.11	-0.97*	-0.99*	0.96*	0.75	-0.89	1.00

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b. Red Maple	Total PyOM mineralized (mg C g $^{-1}$ added C)	Cf (mg C g $^{-1}$ added C)	Cs (mg C g $^{-1}$ added C)	MRT_f (days)	MRT_s (years)	BET - N2 surface area (m^2 g^{-1})	%Long Chain Aliphatics	% Non - lignin phenols	%Carbohydrates	(Recalictrance Index (R50)	Specific UV absorption (254nm)	$PyOM_w$ (mg C)	Energy density (J mg $^{-1}$ C)
Total PyC mineralized (mg C g $^{-1}$ added C)	1.00												
Cf (mg C g $^{-1}$ added C)	0.96*	1.00											
Cs (mg C g $^{-1}$ added C)	1.00	0.96*	1.00										
MRT_f (days)	0.95*	0.84	0.95*	1.00									
MRT_s (years)	-0.83	-0.71	-0.84	-0.90	1.00								
BET - N2 surface area (m^2 g^{-1})	-0.52	-0.45	-0.53	-0.54	0.54	1.00							
%Long Chain Aliphatics	0.58	0.48	0.59	0.63	-0.86	-0.77	1.00						
% Non - lignin phenols	0.99*	0.99*	0.99*	0.90*	-0.77	-0.49	0.52	1.00					
%Carbohydrates	0.94*	0.83	0.95*	0.98*	-0.95*	-0.63	0.76	0.90	1.00				
(Recalictrance Index (R50)	-0.91*	-0.81	-0.91*	-0.94*	0.97*	0.67	-0.85	-0.86	-0.99*	1.00			

Specific UV absorption (254nm)	-0.49	-0.47	-0.49	-0.44	0.63	0.88	-0.90	-0.48	-0.59	0.69	1.00		
$PyOM_w$ (mg C)	1.00*	0.97*	1.00*	0.95*	-0.85	-0.53	0.62	0.99*	0.95*	-0.92*	-0.53	1.00	
Energy density (J mg $^{-1}$ C)	-0.94*	-0.86	-0.94*	-0.94*	0.97*	0.55	-0.78	-0.91	-0.97*	0.98*	0.62	-0.95*	1.00

Table S4. P- values of tested parameters for (a) jack pine (JP) and (b) red maple (RM) wood and PyOM treatments ($\alpha = 0.05$).

a. Jack Pine	Total PyC mineralized (mg C g $^{-1}$ added C)	Cf (mg C g $^{-1}$ added C)	Cs (mg C g $^{-1}$ added C)	MRT_f (days)	MRT_s (years)	BET - N2 surface area (m^2 g $^{-1}$)	%Long Chain Aliphatics	% Non - lignin phenols	%Carbohydrates	Recalictrance Index (R50)	Specific UV absorption (254nm)	% Leachable C	Energy density (J mg $^{-1}$ C)
Total PyC mineralized (mg C g $^{-1}$ added C)													
Cf (mg C g $^{-1}$ added C)	0.03												
Cs (mg C g $^{-1}$ added C)	0.00	0.05											

MRT_f (days)	0.10	0.13	0.11								
MRT_s (years)	0.25	0.40	0.23	0.05							
BET - N2 surface area (m^2 g^{-1})	0.55	0.64	0.54	0.35	0.23						
%Long Chain Aliphatics	0.89	0.94	0.90	0.40	0.25	0.23					
% Non - lignin phenols	0.02	0.15	0.01	0.11	0.14	0.56	0.81				
%Carbohydrates	0.08	0.28	0.05	0.19	0.13	0.41	0.76	0.02			
(Recalictrance Index (R50)	0.06	0.22	0.04	0.09	0.07	0.34	0.64	0.01	0.00		
Specific UV absorption (254nm)	0.18	0.28	0.17	0.01	0.00	0.21	0.27	0.13	0.15	0.07	
% Leachable C	0.00	0.03	0.00	0.06	0.19	0.51	0.81	0.02	0.07	0.04	0.13

Energy density (J mg $^{-1}$ C)	0.07	0.27	0.05	0.23	0.19	0.53	0.88	0.01	0.00	0.01	0.21	0.07	

b. Red Maple	Total PyC mineralized (mg C g $^{-1}$ added C)	Cf (mg C g $^{-1}$ added C)	Cs (mg C g $^{-1}$ added C)	MRT_f (days)	MRT_s (years)	BET - N2 surface area (m^2 g^{-1})	%Long Chain Aliphatics	% Non - lignin phenols	%Carbohydrates	(Recalcitrance Index (R50)	Specific UV absorption (254nm)	Leachable C (mg C)	Energy density (J mg $^{-1}$ C)
Total PyC mineralized (mg C g $^{-1}$ added C)													
Cf (mg C g $^{-1}$ added C)	0.01												
Cs (mg C g $^{-1}$ added C)	0.00	0.01											
MRT_f (days)	0.02	0.12	0.02										
MRT_s (years)	0.12	0.25	0.12	0.07									

BET - N2 surface area (m^2 g^{-1})	0.45	0.52	0.45	0.43	0.43							
%Long Chain Aliphatics	0.39	0.50	0.38	0.33	0.10	0.19						
% Non - lignin phenols	0.00	0.00	0.00	0.06	0.18	0.48	0.45					
%Carbohydrates	0.03	0.12	0.03	0.00	0.03	0.33	0.20	0.07				
(Recalictrance Index (R50)	0.05	0.15	0.05	0.03	0.01	0.30	0.11	0.10	0.00			
Specific UV absorption (254nm)	0.49	0.51	0.48	0.53	0.33	0.08	0.06	0.50	0.37	0.27		
Leachable C (mg C)	0.00	0.01	0.00	0.03	0.11	0.44	0.35	0.00	0.03	0.04	0.44	
Energy density (J mg^{-1} C)	0.03	0.09	0.03	0.03	0.01	0.42	0.17	0.06	0.01	0.00	0.35	0.02

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