International Biochar Initiative

Summary of Recently Published Biochar Research March 2024

The following published research papers are from new entries in Google Scholar, collected by Dr. Abhilasha Tripathi (Agronomist, Circonomy). This summary is provided as a service to members of the International Biochar Initiative.

Entries with this symbol 🔓 link to open-access articles.

Bachman, B. F., & Hamers, R. J. (2024). Carbon-Negative **production of Hydrogen** through Sulfur Intermediates. https://doi.org/10.26434/chemrxiv-2024-8hfnv

Bu, Q., Yu, F., Cai, J., Bai, J., Xu, J., Wang, H., (2024) Preparation of sugarcane bagasse-derived Co/Ni/N/MPC nanocomposites and its application in **H2O2 detection**. Elsevier. https://www.sciencedirect.com/science/article/pii/S092666902400195X

> **From the Abstract:** "The linear range was 0.05–272.15 mM, and the detection limit was 0.56 µM (S/N = 3), which was applied in the actual sample detection. We achieved recovery rates of 98.3–98.9% and relative standard deviations (RSD) of 2.6–4.2% for the detection of H2O2 in tap water samples."

Gimba, U., Aransiola, S., Oyewole, O., & Greens, N. M.-M. (2024) Marine Greens: Roles in Climate Change and Global Warming Mitigation. Taylorfrancis.Com. https://www.taylorfrancis.com/chapters/edit/10.1201/9781003369738-5/marine-greens-umm-kulthum-abubakar-gimba-sesan-abiodun-aransiola-oluwafemi-adebayo-oyewole-naga-raju-maddela

Li, X., Zhao, Q., Li, L., Mei, W., Wang, Z., … Q. G.-J. of, (2024) **Enhanced dewaterability** of food waste digestate by biochar/potassium ferrate treatments: Performance and mechanisms. Elsevier.

https://www.sciencedirect.com/science/article/pii/S0301479724002548

From the Abstract: "BC/PF treatment significantly enhanced the dewaterability of digestate, with the minimum specific resistance to filtration of (1.05 ± 0.02) × 1015 m·kg−1 and water content of 57.52 ± 0.51% being obtained at the concentrations of 0.018 g·g−1 total solid (TS) BC300 and 0.20 g·g−1 TS PF, which were 8.60% and 13.59% lower than PF treatment, respectively."

Qi, S., Zhao, Z., Ou, Y., Liu, L., Ren, Y., … W. D.-S. and, (2024) Calcium-rich biochar-enhanced Cu-Al2O3 fenton-like catalyst with dual reaction centers for **efficient decomplexation** of Ni-EDTA. Elsevier.

https://www.sciencedirect.com/science/article/pii/S1383586624005008

From the Abstract: "The presence of biochar not only enhanced the loading of Cu species but also introduced additional electron transfer channels, while $CaCO_3$ further interacted with biochar/Cu species to amplify the electron cloud density surrounding Cu. The improvement of electronic polarization facilitated the activation of H_2O_2 and the generation of $•O_2^-$, $^1O_2$ and •OH. Contrary to conventional interfacial reactions, the weak adsorption between Cu-Al_2O_3-CRB and Ni-EDTA due to the electrostatic repulsion, led to the decomplexation reactions primarily occurring in the solution phase, rather than on the catalyst surface."

Roychowdhury, S., Production, S. G.-J. of C., (2024) State-of-the-art of **biochar amended dark fermentative hydrogen production**: A sustainable coupling of decarbonization pathways towards low carbon future. Elsevier.

https://www.sciencedirect.com/science/article/pii/S0959652624006553

From the Abstract: "Amendment of different biochar have remarkably facilitated 20.72–328.51% enhancement of the hydrogen yield (HY) and 26.05–575.41% enhancement of hydrogen production rate (HPR), validating the immense potential of the biochar for amelioration of hydrogenesis performance of DF systems. Formation of stable biofilm of hydrogen producing bacteria (HPB), regulation of the system pH, facilitation of better electron transfer and stimulation of the hydrogenase enzymes are the main factors responsible for enhancement of hydrogenesis by biochar."

Song, D., Bioenergy, J. L.-B. and, (2024) Valorization of biochar and lignin derived from the NaOH pretreatment of lignocellulosic biomass for applications as an **adsorbent and antioxidant**. Elsevier.

https://www.sciencedirect.com/science/article/pii/S0961953424000564

From the Abstract: "larch exhibited a higher NaOH-L recovery yield (16.98 and 21.93%) than oak (5.83 and 15.02%). The NaOH-L from larch (IC50 for DPPH and ABTS of 0.49–1.03 and 0.04–0.06, respectively) had a higher antioxidant activity than that of oak (IC50 for DPPH and ABTS of 1.77–2.68 and 0.39–0.53, respectively). The removal rate of ibuprofen was high for larch biochar following a 4% NaOH pretreatment."

Yadav, N., Yadav, G., Energy, M. A.-R., (2024) Camellia sinensis leaf-assisted green synthesis of SO3H-functionalized ZnS/biochar nanocatalyst for highly **selective solketal production** and improved reusability in methylene blue dye adsorption. Elsevier.

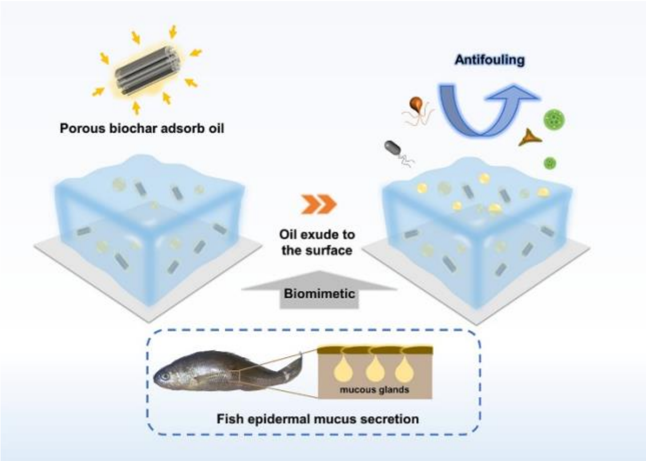
https://www.sciencedirect.com/science/article/pii/S0960148124002416

From the Abstract: "The ideal reaction conditions involved an 8:1 M ratio of acetone to glycerol (AC to GL), a 6 wt% catalyst loading, an 8-min reaction time, and a temperature of 60 °C… The catalyst was reusable up to 6 reaction runs in the solketal synthesis, which remarks the high stability of the ZBC-SO_3H. Further, the reusability of the ZBC-SO_3H (remaining catalyst after 6 runs) was examined in the adsorption of methylene blue (MB) dye."

Yi, P., Wang, X., Sun, H., Wang, M., Nan, Y., … M. R.-P. in O., (2024) Biomimetic self-lubricating silicone composite based on **biochar for antifouling with improved long-term release**. Elsevier.

https://www.sciencedirect.com/science/article/pii/S0300944024000985

From the Abstract: "Biochar, as an emerging environmentally friendly material, has a unique porous structure that can effectively adsorb oil and achieve functions of huge oil storage and slow exudation."



Yin, Q., Zhu, G., Wang, R., Energy, Z. Z.-, (2024) Enhancing the **thermal storage performance** of biochar/paraffin composite phase change materials: Effect of oleophobic modification of biochar. Elsevier.

https://www.sciencedirect.com/science/article/pii/S0360544224004870

From the Abstract: "The oleophobic properties of biochar could effectively prevent PW leakage, and resulted in a high PW loading rate of 84.26% and an encapsulation efficiency of 82.26%... PW/Zn-WPC-A exhibited a thermal conductivity 3.28 times that of pure PW, displaying excellent thermal responsiveness. The fusion enthalpy of PW/Zn-WPC-A was 107.2 J/g."

Zhong, C., Guo, Z., Hang, J., Xu, S., Song, H., … W. L.-J. of E., (2024) An Efficient and General Oxidative Magnetization for Preparation of Versatile **Magnetic Porous Biochar** at Low Temperature. Elsevier.

https://www.sciencedirect.com/science/article/pii/S2213343724003178

From the Abstract: "The magnetic biochar possessed 145.71, 72.58, and 322.48 mg/g maximum adsorption amounts for Cr6+, methylene blue, and tetracycline with 17.11 emu/g saturation magnetization, respectively, in which nanoscale iron oxides and oxygen functional groups made significant contributions."

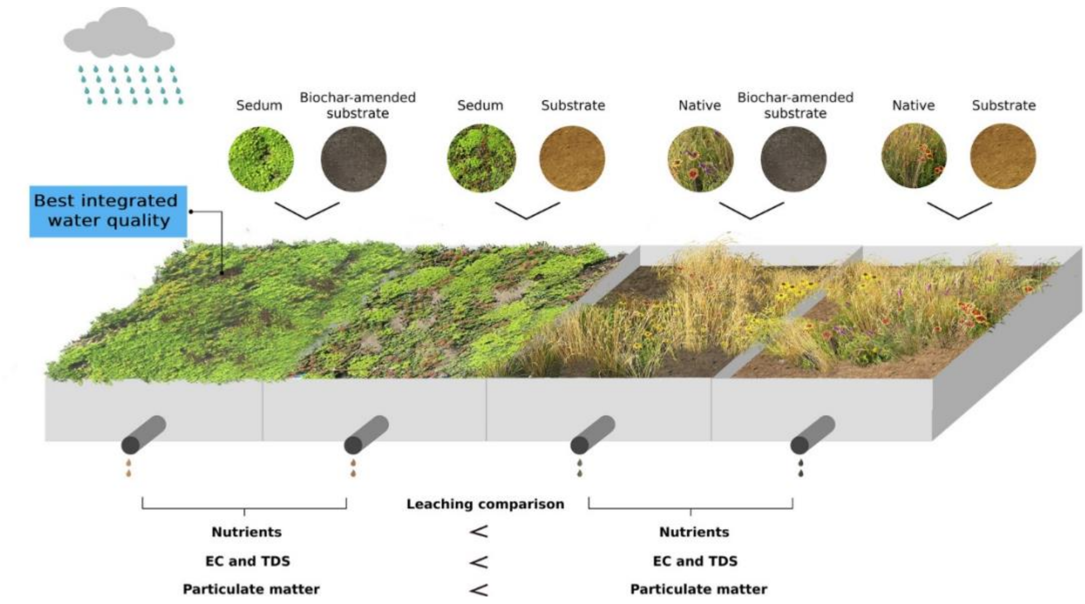
Dayanthi, W., Jagoda, S., ENGINEER, K. H.-, (2024) Laboratory Experiments on Remediation of Landfill Leachate Contamination with **Permeable Reactive Barriers (PRBs)** of Reactive Media Derived from Waste. Account.Engineer.Sljol.Info, LVII(01), 2024. https://doi.org/10.4038/engineer.v57i1.7640

From the Abstract: "In a bench-scale COM-filled PRB (0.85 x 0.25 x 0.3 m), the average removal efficiencies of the same species were 71.4±1.3, 75.4±4.9, 67.4±4.3, 72.9±1.3, 83.6±7.6, 89.8±7.4, and 80.9±7.1%, respectively. Adsorption associated with fixation, and ion exchange could be the main treatment mechanisms."

Junior, I. M. I., Sperandio, G. H. G., … R. M.-N. A. W., Moreira, R. P. L., & Silva, T. A. (2024). Nanocarbon as Catalyst Support for **Fuel Hydrogen Generation** by Hydrolysis of Sodium Borohydride. Springer, 293–308. https://doi.org/10.1007/978-981-99-9935-4_16

Liao, W., Sidhu, V., Sifton, M., … L. M.-S. of T. T., (2024) **Biochar and vegetation** effects on discharge water quality from organic-substrate green roofs. Elsevier. https://www.sciencedirect.com/science/article/pii/S0048969724014414

From the Abstract: "



Miao, K., Han, T., Wu, Y., Yu, L., Xie, Y., Zhang, J., (2024) Highly efficient utilization of crop straw-derived biochars in direct carbon solid oxide fuel cells for **electricity generation**. Elsevier. https://www.sciencedirect.com/science/article/pii/S0360319924006396

> **From the Abstract:** "At 850 °C, the single cell employing sesame straw biochar achieved the highest output of 228 mW cm^{-2}, while the DC-SOFC fueled with eggplant straw biochar yielded 214 mW cm^{-2}, both surpassing the 173 mW cm^{-2} output of the activated carbon-powered cell. Furthermore, the sesame straw biochar-fueled cell exhibited the longest operational lifetime of 30.7 h, with a fuel utilization as high as 34.4% at 850 °C and 50 mA."

Miao, Z., Che, N., Chai, W., Zhang, M., & Wang, F. (2024). Hierarchical Porous Carbons Derived from Porous Biomass for **High-Performance Capacitive Deionization**. The Journal of Physical Chemistry C. https://doi.org/10.1021/ACS.JPCC.3C07941

> **From the Abstract:** "the biochar prepared from SP (SPC) had a more suitable aperture structure, better surface wettability, higher surface charge, and larger specific capacitance than those of other biochars prepared from LP and LS (LPC and LSC), which resulted in better desalination performance (9.24 mg·g–1) and charge efficiency (77%) of SPC."

Qu, K., Qiu, Y., Acta, M. D.-E., (2024) Synthesis, Characterization and Application of Tangerine Peel-derived Fe3C/Fe-Encapsulated Biochar for Electrochemical **Removal of Environmental Pollutant**. Elsevier.

https://www.sciencedirect.com/science/article/pii/S0013468624002524

Thunuguntla, R., Atiyeh, H., Zhang, H., … T. E.-B., (2024) Biochar facilitated Biological CO2 conversion to C2–**C6 alcohols and fatty acids**. Elsevier.

https://www.sciencedirect.com/science/article/pii/S0960852424001676

> **From the Abstract:** "Fermentations were in 250-mL bottles containing H2:CO2:N2 (60:20:20) shaken at 125 rpm and 37 °C. SGB350 increased alcohol titers by 1.1–2.1 fold, and PLB350 enhanced acid concentrations by 1.2–1.7 fold compared to the control without biochar."

Zhang, C., Fang, J., Chen, W., … E. K.-S. of T. T., (2024) Effects of water washing and KOH activation for **upgrading microalgal torrefied biochar**. Elsevier.

https://www.sciencedirect.com/science/article/pii/S0048969724013937

> **From the Abstract:** "The results indicate that the HHV ranges of KOH-activated biochar and unactivated biochar are 25.611–32.792 MJ·kg−1 and 25.024–26.389 MJ·kg−1, respectively. Furthermore, KOH-activated biochar is better than unactivated biochar, with less residue, broader pyrolysis and combustion temperature ranges, higher elemental carbon, and less combined carbon."

Rao, L., Jin, B., Chen, D., Jin, X., Liu, G., … Z. H.-C. E., (2024) Energy-saving **CO2 desorption** from amine solution over Fe/SiO2/biochar catalysts: Desorption performance, structure-activity relationship, and mechanism. Elsevier.

https://www.sciencedirect.com/science/article/pii/S1385894724008982

> **From the Abstract:** "The evaluation of catalytic desorption performance showed that compared to the thermal desorption, the optimized ternary catalyst increased the CO2 desorption amount by 35% and

reduced the relative heat duty by 34%. The catalysts exhibited superior stability, with a decrease of only 6.1% in relative energy consumption during five cycles."

Sadjadi, S., Communications, E. M.-I. C., (2024) Composite of chitosan, sulfonated biochar, and metal-organic framework as a **heterogeneous catalyst** for Knoevenagel reaction. Elsevier. https://www.sciencedirect.com/science/article/pii/S1387700324001679

From the Abstract: "The investigation revealed that a variety of substrates readily underwent this reaction, giving products in high yields ranging from 80 % to 95 %. Furthermore, the catalyst demonstrated good recyclability, and stability, maintaining minimal leaching and catalytic activity loss over six consecutive cycles."

Salman, S., Alias, A., Mahdi, H., & … A. S.-J. of E. (2024) Synthesis and Characterization of **xerogel Derived from Palm Kernel Shell Biochar** and Comparison with Commercial Activated Carbon. Jeeng.Net. http://www.jeeng.net/Synthesis-and-Characterization-of-xerogel-Derived-from-Palm-Kernel-Shell-Biochar,183719,0,2.html

Shi, Cai, An, Y., Gao, G., Xue, J., Algadi, H., Huang, Z., & Guo, Z. (2024). Insights into Selective Glucose Photoreforming for **Coproduction of Hydrogen and Organic Acid** over Biochar-Based Heterojunction Photocatalyst Cadmium Sulfide/Titania/Biochar. ACS Sustainable Chemistry & Engineering. https://doi.org/10.1021/ACSSUSCHEMENG.3C04835

From the Abstract: "The as-synthesized CdS/TiO_2/BC exhibited excellent acetic acid selectivity (63.94%) together with improved H_2 generation (~12.77 mmol g^{-1} h^{-1}) in 25 mM NaOH solution, while efficient formic acid selectivity (60.29%) and H_2 generation (~10.29 mmol g^{-1} h^{-1}) were observed in 3 mM Na_2CO_3 solution. Trapping tests indicated that $\cdot O_2^-$ and ·OH promoted the production of acetic acid."

Soodesh, C., Seriyala, A., Design, P. C.-… R. and, (2024) Carbonaceous catalysts (biochar and activated carbon) from agricultural residues and their application in **production of**

biodiesel: A review. Elsevier. https://www.sciencedirect.com/science/article/pii/S0263876224000832

Volpi, M., Silva, J., Hornung, A., Technologies, M. O.-C., (2024) Review of the **Current State of Pyrolysis and Biochar Utilization in Europe**: A Scientific Perspective. Mdpi.Com. https://www.mdpi.com/2571-8797/6/1/10

Zhang, K., Shao, Y., Jiang, Y., Zhang, L., Zhang, S., … Y. W.-M., (2024) Flower-like Cu/bone biochar for **hydrogenation of vanillin**: Importance of evolution of organic matter in chicken bone on property of the catalysts. Elsevier. https://www.sciencedirect.com/science/article/pii/S2468823124000701

> **From the Abstract:** "The catalyst prepared from the chicken bone pre-pyrolyzed at 800 °C exhibited uniform dispersion of metal Cu, with the average particle size of Cu particles of 11.9 nm, achieving the yield of 91.7 % for 2-methoxy-4-methyl phenol from hydrogenation of vanillin."

Zhao, J., Liu, X., He, F., Liu, Y., You, Z., Exhibition, Z. Y.-T. A. M. &, (2024) **Reduction of Zn-Bearing Dust** Using Biomass Char. Springer, 191–199. https://doi.org/10.1007/978-3-031-50304-7_18

> **From the Abstract:** "regardless of the reductant used, the Fe metallization and Zn removal achieved a high level of approximately 95% and over 99%, respectively. However, the removal of K showed variability among the reductants, with removal ranging from 55.36 to 92.98%. The Na removal proved to be more challenging, with removal ratios of less than 20% achieved using all the reductants."

Zhiquan, H., Bingtang, L., CHENG, L., Xun, W., Pedosphere, X. B.-, (2024) Biochar and polyvinyl alcohol (PVA) application improves pH, water-holding characteristics of desert soils and enhances **Microcoleus vaginatus growth**: The implication in combating desertification. Elsevier. https://www.sciencedirect.com/science/article/pii/S1002016024000122

From the Abstract: "The combined application of biochar and PVA resulted in a reduction of soil pH, coupled with significant improvements in WHC (18% to 34%) and DMC (30% to 36%). Moreover, this combined approach exhibited superior effects on photosynthetic resilience and cyanobacterium crust depth (0.9 to 3.5 mm) compared to the application of biochar or PVA in isolation."

Ali, N, Polymers, E. M.-F. and, (2024) **Biocarbon-Enhanced Flexible Nanofiber Mats** for Sustainable Energy Generation and Wearable Device Applications. Springer. https://link.springer.com/article/10.1007/s12221-024-00479-7

From the Abstract: "the effect of thickness was most influential in the thickness of 1 mm of PVDF/biochar nanofibers generator. The results of this work imply promising application development of such flexible composite piezoelectric nanofibrous membranes for environmentally sustainable energy generation and wearable self-powered electrical devices."

Błaszczyk, A., Sady, S., Pachołek, B., Sustainability, D. J.-, (2024) **Sustainable Management Strategies** for Fruit Processing Byproducts for Biorefineries: A Review. Mdpi.Com. https://www.mdpi.com/2071-1050/16/5/1717

Samal, I., Mahanta, D., Bhoi, T., Komal, J., & Jatav, H. (2024). Approaches of **Biochar in Ecosystem Management:** Current Scenario and Future Perspectives. https://www.intechopen.com/online-first/1146052

From the Abstract: "The efficacy of biochar in enhancing nutrient cycles on agricultural lands is highlighted by its positive impact on plant growth and soil vitality, rendering it a practical instrument for mitigating nutrient deficiencies."

Zhu, G., Wang, X., Yin, X., Zhu, M., Li, J., Cao, L., (2024) Influence of inherent minerals on metalworking fluids sludge pyrolysis: **Products characterization and heavy metals behavior**. Cell.Com. https://www.cell.com/heliyon/pdf/S2405-8440(24)02287-4.pdf

From the Abstract: "The highest pyrolysis gas yield was achieved at 18.86 wt% after MFS pyrolysis at 900 ◦C. GC-MS analysis revealed that the inherent minerals facilitated a decrease in oxygenated and nitrogenated compounds within the oil, while simultaneously leading to a substantial increase in hydrocarbon contents. Notably, the highest content of aromatics (61.16%) was attained during pyrolysis at 900 ◦C."

🔓 Chilufya, Gangell, D., Shahin, M. A. ;, Abdullah, H. H., Birgisson, B., Chilufya, A., … Abdullah, H. H. (2024). Performance Study on **Laterite Road Base Stabilised with Emulsions** Incorporating Biochar. Mdpi.Com. https://doi.org/10.3390/buildings14030575

From the Abstract: "The findings revealed that a design mix incorporating 5% biochar and 6% emulsion delivered an average unconfined compressive strength (UCS) of 1.5 MPa, which adheres to the standard UCS range for cemented lightly bound base course material. The optimal ratio of biochar to emulsion was identified as 1:1.6, which delivered a higher resilient modulus value than did the minimum stipulated by the literature for average daily traffic in the first year of design. As the temperature rose, the stabilised laterite base exhibited a reduction in its flexural modulus; however, it demonstrated minimal susceptibility to fluctuations in frequency. The deformation observed in the wheel-tracking tests for mixtures of the optimum biochar-to-emulsion ratio was less than 1 mm…"

🔓 Franco, C., Page-Dumroese, D., Sustainability, D. P.-, (2024) Biochar Utilization as a **Forestry Climate-Smart Tool**. Ideas.Repec.Org. https://ideas.repec.org/a/gam/jsusta/v16y2024i5p1714-d1341807.html

🔓 Liu, W., Chen, S., Mei, Z., Li, L., Catalysts, H. T.-, (2024) Study on the Inhibition of **Hydrogen Evolution Reaction** by Electrocatalytic Reduction of Carbon Dioxide Using Elsholtzia Harchowensis Biochar. Mdpi.Com. https://www.mdpi.com/2073-4344/14/3/172

From the Abstract: “In a solution of PC/water at a ratio of 9:1 (V:V), the FE of converting CO2 to methane (CH4) at −0.32 V (vs. RHE) reached 12.0%, and the FE of carbon monoxide (CO) reached 64.7%. The HER was significantly inhibited, significantly improving the selectivity of electrocatalytic CO2.”

Shi, Z., Xing, K., Rameezdeen, R., & Chow, C. W. K. (2024). Current trends and future directions of global research on **wastewater to energy**: a bibliometric analysis and review. Environmental Science and Pollution Research. https://doi.org/10.1007/S11356-024-32560-2

SHARMA, I. (2024). Biochar derived from post brewing tea waste as efficient anodic catalyst for tailoring the oxidation reactions in **clay microbial fuel cell**. https://doi.org/10.21203/rs.3.rs-3939507/v1

From the Abstract: “Three identical clayware MFCs were used in which MFC-1 worked as a control, in MFC-2 raw PBTW and in MFC-3 synthesized AC-PBTW was coated on the carbon felt anode. MFC-3 achieved the highest current density of 848.48 mA/m2, followed by MFC-1 and MFC-2 with 204 mW/m2 and 194 mW/m2, respectively, with corresponding current densities of 488.34 mA/m2 and 476.68 mA/m2.”

Srihanam, P., Pakkethati, K., Srisuwan, Y., Phromsopha, T., Manphae, A., Phinyocheep, P., & Yamaguchi, M. (2024). Utilization of Bamboo Biochar as a **Multi-Functional Filler of Flexible Poly(L-lactide)-b-Poly(ethylene glycol)-b-Poly(L-lactide) Bioplastic.** Elsevier. https://doi.org/10.21203/rs.3.rs-3895748/v1

From the Abstract: “For the PLLA-PEG-PLLA, the addition of BC induced a nucleation effect that was characterized by a decrease in the cold crystallization temperature and an increase in the crystallinity; however, this effect was not observed for the PLLA. When compared to pure PLLA-PEG-PLLA, the PLLA-PEG-PLLA/BC composites displayed greater thermal stability, tensile stress, and Young’s modulus.”

Zhang, S., Jia, X., Wang, X., Chen, J., Cheng, C., Jia, X., (2024) Using the Conditional Process Analysis Model to Characterize the **Evolution of Carbon Structure** in Taxodium

ascendens Biochar with Varied Pyrolysis Temperature and Holding Time. Mdpi.Com. https://www.mdpi.com/2223-7747/13/3/460

From the Abstract: “pyrolysis at temperatures between 450 and 750 °C accounted for the aromatization of biochar because the atomic H/C ratio of branch-based chars (BC) decreased from 0.53–0.59 to 0.15–0.18, and the ratio of leaf-based chars (LC) decreased from 0.56–0.68 to 0.20–0.22; the atomic O/C ratio of BC decreased from 0.22–0.27 to 0.08–0.11, while that of LC decreased from 0.26–0.28 to 0.18–0.21.”

Rachmani, A. (2024). **Dairy Effluent Steroidal Hormones** Characteristics and Treatment by Anaerobic Digestion (Covered Anaerobic Pond) and Biochar. https://researchcommons.waikato.ac.nz/handle/10289/16473

Shao, Y., Song, J., & Studies, Y. S.-P. J. of E. (2024). Advances in Biochar’s Effect on **Anaerobic Fermentation** Systems. Pjoes.Com, 33(4), 1–10. https://doi.org/10.15244/pjoes/173095

Vento, I. D., Ancco, M., Davila, G. P., & Ancco-Loza, R. (2024) Effects of biochar obtained from grape agricultural residues on **biogas generation**. Alicia.Concytec.Gob.Pe. https://alicia.concytec.gob.pe/vufind/Record/REVALT_563a90aa61855bb4b88f51eaedc5d56a

ບິແພງ, ສອນວມະນີ, ວນະຄອນແກ້, & ໄລຄູ ນອິ. (2024). Study the Utilization of Biochar Derived from Sugarcane Waste to **Enhance the Biogas Efficiency** During the Anaerobic Digestion Process for Treating Pig Farm. Su-Journal.Com, 10(1), 104–112. http://www.su-journal.com/index.php/su/article/view/473

From the Abstract: “the normal system and the system with BC filling at different burning temperatures: 300, 400, 500, 600 and 700℃ in the amount of 0.4g into the system. .64, 46.13, 51.90 and 65.98% respectively.”

Bella, K., Pilli, S., Rao, P., Chemosphere, R. T.-, (2024) Predictive modelling of **methane yield** in biochar-amended cheese whey and septage co-digestion: Exploring synergistic effects using Gompertz and neural networks. Elsevier. https://www.sciencedirect.com/science/article/pii/S004565352400451X

> **From the Abstract:** "The experimental results revealed 29.58% increase in methane yield (486 ± 11.32 mL/gVS) with 27% reduction in lag phase time at 10% TS concentration and 50 g/L of BC loading."

Firmino, M., Trémier, A., Couvert, A., Management, A. S.-W., (2024) New insights into biochar ammoniacal nitrogen adsorption and its correlation to **aerobic degradation ammonia emissions**. Elsevier. https://www.sciencedirect.com/science/article/pii/S0956053X24001156

> **From the Abstract:** "This study concluded that the chemical characteristics of the biochar, including pH and oxygen/carbon atomic ratio, had a greater influence on the adsorption of ammonia nitrogen than physical attributes such as specific surface area. In this regard, nitric acid modification had superior performance compared to hydroxide potassium modification to increase biochar chemical attributes and reduce ammonia emissions when applied to aerobic degradation."

Hu, J., Wachendorf, M., Gwenzi, W., … B. J.-E., (2024) **Improving acid-stressed anaerobic digestion** processes with biochar-towards a combined biomass and carbon management system. Iopscience.Iop.Org. https://iopscience.iop.org/article/10.1088/2515-7620/ad2bb7/meta

Hu, W., Jin, H., Gao, X., Tang, C., Zhou, A., … W. L.-E., (2024) Biochar derived from a**lkali-treated sludge residue regulates anaerobic digestion**: Enhancement performance and potential mechanisms. Elsevier. https://www.sciencedirect.com/science/article/pii/S0013935124004821

From the Abstract: “the activity of electron transfer was increased with the presence of AK-BC, with increase ratio of 21.4%. In addition, the electroactive microorganisms like Anaerolineaceae and Methanosaeta were enriched with the presence of AK-BC, and the potential direct interspecies electron transfer was possibly established.”

Zhang, H., Wei, Z., Xiong, D., Wu, Y., Tong, M., Su, H., (2024) Investigation into the **Structure and Properties of Biochar Co-Activated by ZnCl2 and NaHCO3** under Low Temperature Conditions. Mdpi.Com. https://www.mdpi.com/1996-1944/17/4/942

From the Abstract: “Compared with AC450-4:8:0 prepared by ZnCl2 activation alone, the total pore volume of AC450-4:8:2 prepared by co-activation is increased from 0.595 mL/g to 0.754 mL/g and the mesopore rate from 47.7% to 77.8%, which is conducive to reducing the steric hindrance of the hydration reaction and improving the selectivity.”

Zhang, M., Peng, F., Yu, J., Forests, Z. L.-, (2024) Feedstock-Induced Changes in the **Physicochemical Characteristics of Biochars** Produced from Different Types of Pecan Wastes. Mdpi.Com. https://doi.org/10.3390/f15020366

From the Abstract: “RB (Root biochar) and LB (Leaf biochar) contained significantly more ash and volatile than those of the other pecan biochars, with the highest fixed carbon content being found in NSB (70.1%). All of the pecan biochars were alkaline (7.90–9.87), and HB (Husk biochar), LB, and NSB (Nutshell biochar)) had significantly higher pH values than those of the other biochars. Elemental analysis indicated that RB, NSB, and LB had higher carbon levels (more than 70%) with lower O/C ratios (no more than 0.2).”

Chen, C., Liang, R., Wang, J., Ge, Y., Tao, J., … B. Y.-B. and, (2024) **Simulation and optimization of co-pyrolysis biochar** using data enhanced interpretable machine learning and particle swarm algorithm. Elsevier. https://www.sciencedirect.com/science/article/pii/S0961953424000643

From the Abstract: "The optimal values of H/N ratio and yield obtained were 7.14 and 29.7%. The prediction and optimization of yield and H/N ratio will provide new visual insights into the use of biochar in soil improvement."

Ghaffar, A., Usman, M., Khan, M., Production, M. H.-J. of C., (2024) Simultaneous **solar steam and electricity generation** from biochar based photothermal membranes. Elsevier. https://www.sciencedirect.com/science/article/pii/S0959652624008217

From the Abstract: "Evaporation rates up to 1.26 and 1.16 kg/(m2 h) and solar-to-vapor efficiencies of 80 and 74% were recorded in presence of sodium chloride with two different types of biochar B700 and B300 based photothermal membranes, respectively, under 1 sun illumination. The water evaporation in presence of mixed sodium chloride/magnesium chloride reached up to 1.21 and 1.05 kg/(m2 h) with 77 and 69% efficiency with B700 and B300; due to different solar absorber geometry."

Iwuozor, K. O., Amoloye, M. A., Owolabi, O. O., Egbemhenghe, A. U., Emenike, E. C., Ezzat, A. O., & Adeniyi, A. G. (2024). Sustainable Production and Comparative Liquid Phase Exfoliation of **Onion Peel-Doped Sugarcane Bagasse Hybrid Biochar**. Sugar Tech. https://doi.org/10.1007/S12355-024-01367-3

Kariim, I., Bakari, R., Waidi, Y., … W. K.-J. of A. and, (2024) Optimization of **solvothermal liquefaction of water hyacinth** over PTFE-acid mediated kaolin catalyst for enhanced biocrude production. Elsevier. https://www.sciencedirect.com/science/article/pii/S0165237024000706

From the Abstract: "The process optimization found maximum biocrude yield (32.0 wt%), minimum biochar yield (19.4 wt%) and maximum conversion efficiency (80.6%) at 340 °C, 20 min residence time, and 13 wt% catalyst loading."

Kumar, H., Kimta, N., Guleria, S., Cimler, R., … N. S.-S. of T. T., (2024) **Valorization of non-edible fruit seeds** into valuable products: A sustainable approach towards circular

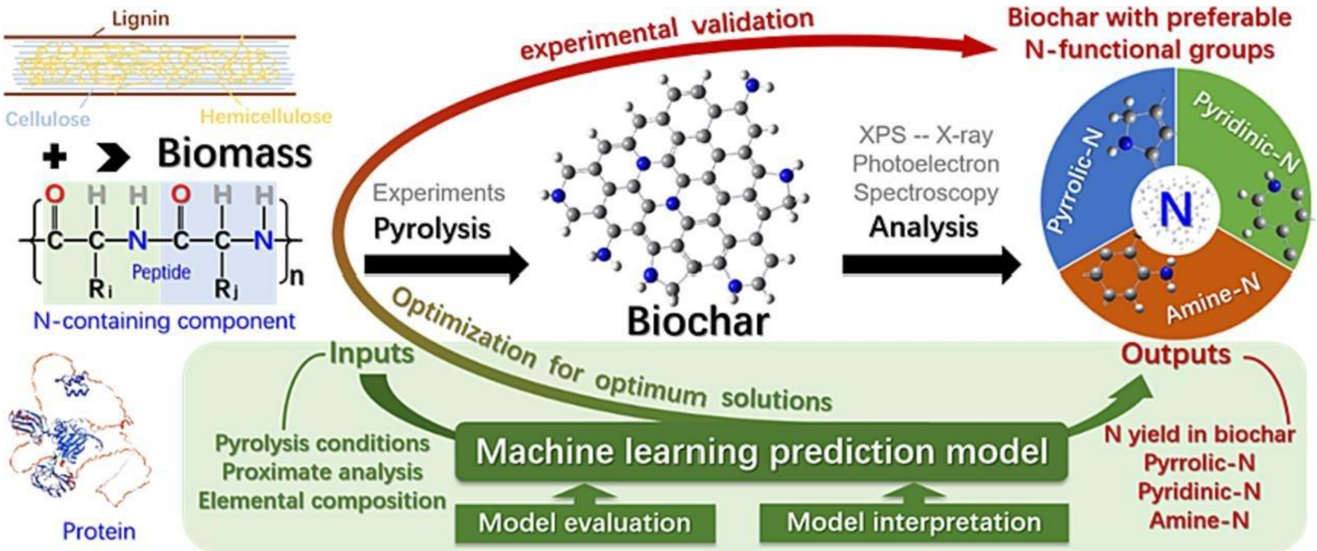
bioeconomy. Elsevier.

https://www.sciencedirect.com/science/article/pii/S0048969724012816

Leng, L., Lei, X., Al-Dhabi, N., Wu, Z., Yang, Z., … T. L.-C. E., (2024) Machine-learning-aided prediction and engineering of **nitrogen-containing functional groups of biochar** derived from biomass pyrolysis. Elsevier.

https://www.sciencedirect.com/science/article/pii/S1385894724013470

From the Abstract: “



Li, Z., Huang, Y., Zhu, Z., Yu, M., Cheng, H., … H. S.-J. of H., (2024) Attempts to obtain clean biochar from hyperaccumulator through pyrolysis: **Removal of heavy metals and transformation of phosphorus**. Elsevier.

https://www.sciencedirect.com/science/article/pii/S0304389424004163

From the Abstract: “as chlorine dosage and pyrolysis residence time increased, added polyvinyl chloride (PVC) reduced the concentration of Zn in biochar to one-tenth of that in PR by intensified chlorination, where both Zn concentration (2727.50 mg/kg) and its leaching concentration (29.13 mg/L) met the utilization requirements, in which the acid-base property of biochar plays a key role in heavy metal leaching.”

Nadarajah, K., … T. A.-W. S. &, (2024) **Biochar from waste biomass**, its fundamentals, engineering aspects, and potential applications: an overview. Iwaponline.Com, 00, 1. https://doi.org/10.2166/wst.2024.051

Ram, S, Ku, X., Biofuels, V. V.-, and, B., (2024) Catalytic **pyrolysis of lignocellulosic and algal biomass** using NaOH as a catalyst. Wiley Online Library. https://onlinelibrary.wiley.com/doi/abs/10.1002/bbb.2599

From the Abstract: "

Ram, Shri, Ku, X., & Vasudev, V. (2024). **Catalytic pyrolysis** of lignocellulosic and algal biomass using NaOH as a catalyst . Biofuels, Bioproducts and Biorefining. https://doi.org/10.1002/BBB.2599

Strugała-Wilczek, A., W. B.-S. of T. T., (2024) Distribution characteristics and **migration pathways of metals during hydrothermal liquefaction** of municipal sewage sludge in the presence of various catalysts. Elsevier. https://www.sciencedirect.com/science/article/pii/S0048969724011628

Sun, K., Wang, Y., Zhang, L., Shao, Y., Li, C., … S. Z.-C. E., (2024) **High yield of carbonaceous material** from biomass via pyrolysis-condensation. Elsevier. https://www.sciencedirect.com/science/article/pii/S1385894724013081

From the Abstract: "The typical biochar yield reaches 60% for the pyro-condensation of poplar sawdust at 450 °C, doubled that from traditional pyrolysis. Additionally, universality of pyrolysis-condensation method for enhancing biochar yield was confirmed by the use of 25 different types of biomasses as research substrates."

Sun, M., Sun, F., Di, H., Wu, C., Sheng, H., … L. L.-M. T., (2024) High value **utilization of waste peanut shell**: Prepared novel shape stable composite phase change materials with high thermal conductivity. Elsevier.

https://www.sciencedirect.com/science/article/pii/S2589234724000435

Wang, B., Chen, Y., Chen, W., Hu, J., Chang, C., Pang, S., (2024) Enhancement of **aromatics and syngas production** by co-pyrolysis of biomass and plastic waste using biochar-based catalysts in microwave field. Elsevier.

https://www.sciencedirect.com/science/article/pii/S0360544224004833

From the Abstract: "Bamboo: PE = 1: 3 catalyzed by Zr-modified biochar-based catalysts resulted in aromatics yielded as high as 74.13%, while phenols yields was only 9.39%. Incorporation of the externally H-donor PE promoted the growth of carbon chains, and the microwave field activated free radicals which facilitated the cyclization and arylation of carbon."

Yang, Jing, Yu, Z., Zhang, X., Ma, X., LU, C., Yang, J., … Zhang, X. (2024). Low-cost pyrolysis of biomass-derived **nitrogen-doped porous carbon**: chlorella vulgaris replaces melamine as a nitrogen source. https://doi.org/10.21203/rs.3.rs-3865787/v1

From the Abstract: "The optimum sample (ZBC@C-5) possessed a surface area of 1508 m^2g^{-1} with abundant nitrogen-containing functional groups. ZBC@C-5 in the three-electrode system exhibited 244.1F/g at 0.5A/g, which was extremely close to ZBC@M made with melamine as the nitrogen source."

Albert Mariathankam, N., & Suruli, K. (2024). Bioprocessing Cassava Bagasse: Part I—Bioproducts and Biochemicals. **Roots, Tubers, and Bulb Crop Wastes**: Management by Biorefinery Approaches, 85–111. https://doi.org/10.1007/978-981-99-8266-0_5

Ayadi, M., Passaseo, D., Bonaccorso, G., Fichera, M., Renai, L., Venturini, L., … Del Bubba, M. (2024). Biochar from **co-pyrolysis of biological sludge and sawdust** in comparison with the conventional filling media of vertical-flow constructed wetlands for the treatment of domestic-textile wastewater. Iwaponline.Com, 00, 1.

https://doi.org/10.2166/wst.2024.056

From the Abstract: "Biochar-based systems provided a statistically significant improvement in COD (Δ = 22%) and ammonia (Δ = 35%) removal, as well as in the reduction of UV–Vis absorbance values (Δ = 32–34% and Δ = 28% for 254 and 420 nm, respectively), compared to gravel-filled microcosms."

BioResources, N. D.-, (2024) Estimation of Pruning Wastes and **Biochar Production Potential of Turkey**. Ojs.Cnr.Ncsu.Edu. http://ojs.cnr.ncsu.edu/index.php/BRJ/article/view/22961

Harnchanaphol, S., … K. K.-I. E., (2024) Organic Waste Conversion by **Torrefaction** Pretreatment. Rericjournal.Ait.Ac.Th. http://www.rericjournal.ait.ac.th/index.php/reric/article/view/2535

From the Abstract: "The optimal conditions were evaluated with two parameters; increase of HHV compared to reference condition and % mass yield. Increase temperature was significant effect to increase HHV value of biochar. The optimal time and temperature for getting the highest heating value were 60 minutes and 280°C."

Jayamini, H. P. A., Dassanayake, K. M. M., Senavirathna, G. R. U., & Liyanage, D. (2024) Design and Development of a Pyrolysis Reactor to **Produce Biochar at Industrial Scale**. Account.Engineer.Sljol.Info, LVII(01), 2024. https://doi.org/10.4038/engineer.v57i1.7637

Kong, L., Li, C., Sun, R., Zhang, S., Wang, Y., … J. X.-C. J. of, (2024) Thermal pretreatment of willow branches **impacts yield and pore development** of activated carbon in subsequent activation with ZnCl2 via modifying cellulose structure. Elsevier. https://www.sciencedirect.com/science/article/pii/S1004954124000545

From the Abstract: "that thermal pretreatment at 360 °C (WB-360) could lead to substantial pyrolysis to form biochar with yield of 31.9%, accompanying with nearly complete destruction of cellulose crystals and remarkably enhanced aromatic degree. However, cellulose residual in WB-360 could still be activated to form AC-360 with specific surface area of 1837.9 m2·g−1, which was lower than that in AC from activation of untreated WB (AC-blank, 2077.8 m2·g−1)."

Kourdi, S. El, Abderafi, S., Cheddadi, A., … J. M.-E. C. and, (2024) Simulation and multi-objective optimization of argan residues **slow pyrolysis** for polygeneration of bio-oil, biochar, and gas products. Elsevier.
https://www.sciencedirect.com/science/article/pii/S019689042400147X

From the Abstract: "the best pyrolysis conditions for all three argan residues are temperatures between 470 and 490 °C, with no holding time at the final temperature. For argan shells, press cakes, and pulps, the obtained maximum bio-oil yields were 25.45 %, 23.40 %, and 19.19 %; biochar yields were 37.99 %, 36.33 %, and 38.97 %; and gas yields were 36.56 %, 40.27 %, and 41.85 %, respectively."

Li, T., Peng, H., He, B., Hu, C., Zhang, H., Li, Y., (2024) **Cellulose de-polymerization** is selective for bioethanol refinery and multi-functional biochar assembly using brittle stalk of corn mutant. Elsevier.
https://www.sciencedirect.com/science/article/pii/S0141813024012510

From the Abstract: "the desirable biochar was attained from one-step KOH treatment with the entire brittle stalk, which was characterized as the highly-porous nanocarbon that is of the largest specific surface area at 1697.34 m2/g and 2-fold higher dyes adsorption. Notably, this nanocarbon enabled to eliminate the most toxic compounds released from CaO pretreatment and enzymatic hydrolysis, and also showed much improved electrochemical performance with specific capacitance at 205 F/g."

Lin, H., Li, C., Jiang, Y., Zhang, L., Zhang, S., … D. W.-J. of A. and, (2024) **Hydrothermal carbonization** of pretreated pine needles: The impacts of temperature and atmosphere in pretreatment on structural evolution of hydrochar. Elsevier.
https://www.sciencedirect.com/science/article/pii/S0165237024000755

From the Abstract: "pretreatment at 250 °C could increase overall yield of hydrochar in subsequent HTC, due to the enhanced aromatization and the resistance towards fragmentation in HTC. Nonetheless, the HTC worked on biochar formed at 250 °C, facilitating deoxygenation to remarkably decrease O/C ratio. In comparison, the pretreatment at 350 °C removed substantial amount of volatile fractions, significantly increasing chemical inertness of resulting char-350 during the followed HTC.”

Liu, Y., Siyal, A., Zhou, C., Liu, C., Fu, J., … Y. Z.-C. E., (2024) Microwave co-pyrolysis of **industrial sludge and waste biomass:** Product valorization and synergistic mechanisms. Elsevier. https://www.sciencedirect.com/science/article/pii/S1385894724015183

Puri, L., Hu, Y., & Fuels, G. N.-F. in. (2024) Role of **ash content and composition** in biomass pyrolysis. Frontiersin.Org.
https://www.frontiersin.org/articles/10.3389/ffuel.2024.1378361/full

Souza, P. G. A., do Carmo Lima Carvalho, J., de Souza, L. Z. M., Lima, E. N., de Aguilar, M. G., Lima, R. P., … Machado, A. R. T. (2024). Effect of Pyrolysis Temperature on the **Production of Biochar and Biomethanol** from Sugarcane Bagasse. Bioenergy Research.
https://doi.org/10.1007/S12155-024-10733-8

From the Abstract: “The yield of biochar decreased significantly from 45.3 to 3.5% with a temperature increase of 300 to 1000 °C. The morphological analysis revealed that biochar produced at lower temperatures (300 °C and 400 °C) showed tubular and spongy structures, whereas at higher temperatures (600 °C and 800 °C), the structures morphed into holes and thinned further, ultimately degrading further at 1000 °C.”

Zhong, X., Li, C., Wang, L., Zhang, L., … S. Z.-A. S., (2024) **Varied Pyrolysis Behaviors** of Typical Forestry, Kitchen, and Manure Wastes in CO2. ACS Publications.
https://pubs.acs.org/doi/abs/10.1021/acssusresmgt.3c00095

From the Abstract: “pore blocking from molten intermediates diminished the pores (104.4 $m^2 g^{-1}$). Sawdust-char showed the most developed porous structures (472.1 $m^2 g^{-1}$) with mainly micropores. Degradation of cellulose/hemicellulose and lignin together in sawdust created defective structure intermediates bearing phenolic −OH and carbonyls that were reactive with CO_2 to generate more pores (472.1 $m^2 g^{-1}$).”

Qin, Z., You, J., Rao, M., Zhang, X., Luo, J., & Z. P.-T. A. M., … Peng, Z. (2024). **Microwave-Assisted Reduction** Behaviors of Spent Cathode Material with Biochar. Springer, 307–314. https://doi.org/10.1007/978-3-031-50304-7_29

Setyawan, H., Sunyoto, N., … Y. S.-B. W. of, (2024) Characterisation of **biochar from various carbon sources**. Bio-Conferences.Org. https://www.bio-conferences.org/articles/bioconf/abs/2024/09/bioconf_icgab2024_06003/bioconf_icgab2024_06003.html

Vercruysse, W., Muniz, R., Joos, B., … A. H.-B., (2024) **Co-pyrolysis of chicken feathers and macadamia nut shells**, a promising strategy to create nitrogen-enriched electrode materials for supercapacitor applications. Elsevier. https://www.sciencedirect.com/science/article/pii/S0960852424001202

From the Abstract: "Co-pyrolysis increased nitrogen retention during pyrolysis from 9 % to 18 % compared to CF mono-pyrolysis, while the porosity was maintained. After removing undesirable inorganic impurities by dilute acid washing, this led to a specific capacitance of 21F/g using a scan rate of 20 mV/s. Finally, cycling stability tests demonstrated good stability with 73 % capacitance retention after 10 000 cycles."

Wei, Y., Xu, D., Xu, M., Zheng, P., … P. D.-J. of the E., (2024) Catalytic **hydrothermal liquefaction of municipal sludge** by hydrochar to produce biocrude. Elsevier. https://www.sciencedirect.com/science/article/pii/S1743967124000400

From the Abstract: "the highest yield of biocrude could be achieved at 5 wt% BC, 15 wt% KOH/BC, and 5 wt% H_2SO_4/BC catalysts under used conditions, which could reach 17.84 wt%, 16.99 wt%, and 18.00 wt%, respectively. They were all higher than that of the non-catalytic condition (16.86 wt%). H_2SO_4/BC gave the greatest boost to the biocrude yield (18.00 wt%) and the highest energy recovery (ER up to 51.15% at 5 wt% loading), 8.85% higher than the energy recovery without catalyst (42.30%). H_2SO_4/BC also increased the hydrocarbon content and decreased the phenol content in biocrude."

Zhao, C., Jiang, Z., Lu, X., Yue, W., Chen, J., Bioenergy, X. L.-B. and, (2024) Prediction of **biochar yield** based on machine learning model of "enhanced data" training. Elsevier. https://www.sciencedirect.com/science/article/pii/S0961953424000424

> **From the Abstract:** "The LightGBM model is more suitable for the prediction of biochar yield, and the LightGBM_c model performs best, with R2 of 0.890 and MAE of 2.549, RMSE is 3.627."

Zhao, W., Liu, S., Li, N., Zhang, J., Zhang, G., and, S. X.-I. C., (2024) **Nitrogen-rich pyrolysis** to nitrogen-containing compounds in CO2/N2 atmosphere: Nitrogen configuration and transformation path. Elsevier. https://www.sciencedirect.com/science/article/pii/S0926669024001894

> **From the Abstract:** "When the mixing ratio of urea is 60% at 550 °C, the highest nitrogen compound content is 45.03%, which is 1.7 times higher than that in N_2 atmosphere. When the mass mixture ratio of chitosan is less than 60%, its content reaches its maximum at 500 °C, reaching 13.32%, which is 1.2 times the content under N_2 atmosphere."

Chakravarty, K., Sadi, M., Chakravarty, H., Chemosphere, J. A.-, (2024) Pyrolysis kinetics and potential utilization analysis of cereal biomass by-products; an experimental analysis for **cleaner energy productions in India**. Elsevier. https://www.sciencedirect.com/science/article/pii/S0045653524003138

Hongthong, S., Sangsida, W., … S. W.-I. J. of, (2024) Enhanced Biochar Production via **Co-Pyrolysis of Biomass Residual with Plastic Waste** after Recycling Process. Hindawi.Com. https://www.hindawi.com/journals/ijce/2024/1176275/

> **From the Abstract:** "The results showed that a 20% blend of plastic waste with wood at 300°C produced a solid char with a yield of 40% by weight. Co-pyrolysis of the biochar derived from blends of 20 wt. % PP with both sawdust and hardwood resulted in significant enhancement of various properties of the resulting biochar, including surface area, carbon content, hydrophobicity, and aromaticity."

🔓Kim, D., Energy, S. H.-R., (2024) **Oxidative pyrolysis of biosolid**: Air concentration effects on biochar formation and kinetics. Elsevier. https://www.sciencedirect.com/science/article/pii/S096014812400171X

🔓González-Prieto, Ó., Torres, L. O., Sciences, A. V. T.-A., (2024) Comparison of Waste Biomass from Pine, Eucalyptus, and Acacia and the Biochar Elaborated Using Pyrolysis in a **Simple Double Chamber Biomass Reactor**. Mdpi.Com. https://www.mdpi.com/2076-3417/14/5/1851

From the Abstract: "Fixed carbon of 70%, 77%, and 71% with pine, acacia, and eucalyptus biomass have been obtained, respectively, with yields between 30% and 40%."

🔓Oancea, F., Claudiu Fierăscu, R., Ps, G., Cîlt, M., Mîrt, A.-L., Neamt, C., & Vasilievici, G. (2024). **Catalytic Pyrolysis** of Waste Biomass. Mdpi.Com, 90, 46. https://doi.org/10.3390/proceedings2023090046

🔓Sankaranarayanan, S., Bioenergy, W. W.-G., (2024) Catalytic pyrolysis of **biomass to produce bio-oil** using layered double hydroxides (LDH)-derived materials. Wiley Online Library, 16(3). https://doi.org/10.1111/gcbb.13124

🔓Sharma, T., Hakeem, I., Gupta, A., … J. J.-J. of the E., (2024) Parametric influence of process conditions on thermochemical techniques for **biochar production**: A state-of-the-art review. Elsevier. https://www.sciencedirect.com/science/article/pii/S1743967124000370

Putri, A. H. I., Steven, S., Oktavia, F. D., Restiawaty, E., Adilina, I. B., Safaat, M., … Bindar, Y. (2024). **Pyrolysis of macroalgae residue** from the agar industry for silica-rich biochar and other sustainable chemicals: Process performances, product applications, and

simple business scenario. Biofuels, Bioproducts and Biorefining.
https://doi.org/10.1002/BBB.2597

From the Abstract: "This silica-rich biochar also contains Na and K, which hold potential benefits in agriculture, serving as soil ameliorants and playing a crucial role in enhancing soil fertility and promoting plant growth. In the meantime, BCO contains 29.3% carboxylic acid group as the most important chemical component. Other than that, the biopyrolysis gas contains mainly CH4 and H2 (up to 24–32%), which can act as chemical building blocks."

AlDossary, N., AlKhowildi, F., … J. M.-I., (2024) Design of Biochar Based Adsorber (Bio-Sorb) for **Direct Carbon Capture**. Onepetro.Org.
https://onepetro.org/IPTCONF/proceedings-abstract/24IPTC/All-24IPTC/542359

From the Abstract: "The biochar adsorber system should of size (height= 230.87 cm and diameter= 124.99 cm) with a minimum carbon requirement of 840.20 kg of biochar and a biochar saturation time of 1.73 days. The total amount of CO2 adsorbed onto biochar using one large-scale biochar adsorber system is estimated to be 1000.18 ton/per."

Cordoba-Ramirez, M., Chejne, F., J. A.-S. and P., (2024) Experimental strategy for the preparation of adsorbent materials from torrefied palm kernel shell oriented to **CO2 capture**. Springer. https://link.springer.com/article/10.1007/s11356-024-32028-3

From the Abstract: "Pyrolysis temperature is a key factor in CO_2 adsorption capacity, leading to a CO_2 adsorption capacity of up to 75 mg/g_{CO2} for biochar obtained at 700 °C from non-torrefied palm kernel shell (Char700). Activated carbon obtained from torrefied palm kernel shell at 280 °C (T280-CHAR700-AC) exhibited the highest CO_2 adsorption capacity (101.9 mg/g_{CO2}). Oxygen-containing functional groups have a direct impact on CO_2 adsorption performance due to electron interactions between CO_2 and these functional groups."

Wu, W., Wu, C., Liu, J., Yan, H., Li, G., Zhao, Y., (2024) Synergistic effects of heteroatom doping and narrow micropores on **carbon dioxide capture** in bamboo shoot shell-based porous carbon. Elsevier. https://www.sciencedirect.com/science/article/pii/S1383586624004295

From the Abstract: "A salient specimen, designated BSNC-800–2, showcased an unparalleled CO_2 adsorptive uptake of 5.93 mmol/g at 0 °C and 3.83 mmol/g at 25 °C, attributable to its expansive specific surface area and substantive microporous volume. It was discerned that the interplay between the dopant concentrations and the proportion of narrow micropores was pivotal in modulating CO_2 adsorption efficacy."

Franco, C. R., Page-Dumroese, D., Sustainability, D. P.-, (2024) **Biochar Utilization** as a Forestry Climate-Smart Tool. Mdpi.Com. https://www.mdpi.com/2071-1050/16/5/1714

Salma, A, Fryda, L., Resources, H. D.-, (2024) Biochar: A Key Player in **Carbon Credits and Climate Mitigation**. Mdpi.Com. https://doi.org/10.3390/resources13020031

Sreńscek-Nazzal, J., Kamińska, A., Materials, J. S.-, (2024) Chemical Activation of Banana Peel Waste-Derived Biochar Using KOH and Urea for **CO_2 Capture**. Mdpi.Com. https://www.mdpi.com/1996-1944/17/4/872

From the Abstract: "A series of KOH-activated samples showed CO_2 adsorption at 1 bar to 5.75 mmol/g at 0 °C and 3.74 mmol/g at 25 °C. The incorporation of nitrogen into the carbon sorbent structure increased the carbon uptake capacity of the resulting materials at 1 bar to 6.28 mmol/g and to 3.86 mmol/g at 0 °C and 25 °C, respectively."

Xie, X., Li, M., Lin, D., Li, B., Li, C., Separations, D. L.-, (2024) **CO_2 Adsorption** by Bamboo Biochars Obtained via a Salt-Assisted Pyrolysis Route. Mdpi.Com. https://www.mdpi.com/2297-8739/11/2/48

Chen, X., Beatty, D. N., Matar, M. G., Cai, H., & Srubar, W. V. (2024). Algal Biochar-Metal Nanocomposite Particles Tailor the Hydration Kinetics and **Compressive Strength of**

Portland Cement Paste. ACS Sustainable Chemistry & Engineering, 12(9), 3585–3594. https://doi.org/10.1021/ACSSUSCHEMENG.3C06592

From the Abstract: "3 wt % biochar-Zn delayed peak heat evolution during cement hydration from 8.3 to 10.0 h, while 3 wt % addition of biochar-Ca induced a minor acceleration of peak heat from 8.3 to 8.2 h. Both biochar-Zn and biochar-Ca nanocomposite particles increased the compressive strength of cement paste at 28 days by 22.6 and 17.0%, respectively."

Xiong, Y., Zhang, Z., Zhang, C., Production, J. X.-J. of C., (2024) Foam-stability enhancement in **biochar-infused foam concrete**: Analyzing ionic strength, interparticle distance, and water state. Elsevier. https://www.sciencedirect.com/science/article/pii/S0959652624006784

From the Abstract: "the introduction of corn husk biochar (CHBC) within the base mix expedites flocculation formation, reducing interparticle distance and subsequently elevating the yield stress. Conversely, the inclusion of rice husk biochar (RHBC) diminishes ion concentration, heightening repulsion forces between particles and thereby reducing yield stress of base mix."

Schulte, S., Lübkemann-Warwas, F., Kroll, S., & Siebert-Raths, A. (2024). Novel olive stone biochar particle network for piezoresistive strain sensing in **natural fiber-reinforced composites**. Polymer Composites. https://doi.org/10.1002/PC.28160

From the Abstract: "Gauge factors (GF) of NFRC samples with integrated biochar particles reached 30–80 while carbon black could not exceed a GF of 8."

Zaid, O., Alsharari, F., Materials, M. A.-C. and B., (2024) Utilization of engineered biochar as a binder in **carbon negative cement-based composites**: A review. Elsevier. https://www.sciencedirect.com/science/article/pii/S0950061824003878

From the Abstract: "biochar enhances hardened biochar-cement composites' physical, durability, and microstructural characteristics, with an optimal cement replacement of 1–2% wt. Adding biochar further improves endurance against permeability, shrinkage, sulfate attacks, and chloride-induced corrosion."

Chen, Y., Guo, R., Ma, F., Zhou, H., Zhang, M., Materials, Q. M.-, (2024) Effect of Coffee Grounds/Coffee Ground Biochar on **Cement Hydration and Adsorption Properties**. Mdpi.Com. https://doi.org/10.3390/ma17040907

From the Abstract: "CGB was incorporated into cement, it enhanced the ability to adsorb chloride ions. (3) Cement containing 8% CGB content can slightly enhance the adsorption of formaldehyde."

Das, D., Masek, O., Storage, M. P.-J. of E., (2024) Development of novel form-stable **PCM-biochar composites** and detailed characterization of their morphological, chemical and thermal properties. Elsevier. https://www.sciencedirect.com/science/article/pii/S2352_152X24005796

Mosaberpanah, M., Olabimtan, S., Sustainability, A. B.-, (2024) Effect of **Biochar and Sewage Sludge Ash** as Partial Replacement for Cement in Cementitious Composites: Mechanical, and Durability Properties. Mdpi.Com. https://www.mdpi.com/2071-1050/16/4/1522

From the Abstract: "In mortar, the use of biochar could reduce capillary absorption. In addition, its inclusion fastens the rate of hydration of the cement and prevents shrinkage cracks in the mix."

Egodagamage, H, Yapa, H., Buddika, S., … T. L.-S., (2024) Enhancement of **impact resistance of alkali-activated slag concrete** through biochar supplementation. Wiley Online Library. https://onlinelibrary.wiley.com/doi/abs/10.1002/suco.202300469

From the Abstract: "adding RB up to 6% improved, notably the 28-day compressive strength of AASC. At 6% RB, the strength enhancement was 44.6%, whereas no additional gain was observed at the 8% RB blend. More importantly, except for the 8% RB sample, the impact resistance was considerably augmented with the RB level increment. The increment in the impact number at the first crack and the failure in the 6% RB sample were as high as 185% and 180%, respectively."

Gong, X., Shi, W., Zhang, Z., Luo, M., Zhang, B., … S. W.-J. of, (2024) Exploring the effects of zeolite, biochar, and diatomite as additives for enhancing **heavy metals passivation and eliminating antibiotic resistance genes** in composts during vermicomposting of dewatered sludge and green waste. Elsevier. https://www.sciencedirect.com/science/article/pii/S2213343724003312

From the Abstract: "the addition of ZL, BB, and DM significantly enhanced the reduction rate of intI-1 (2.45%−20.86%), sul1 (8.16%−26.46%), sul2 (18.88%−29.55%), ermB (30.25%−40.08%), ermC (19.25%−28.53%), gryA (22.99%−30.04%), parC (18.75%−20.46%), qnrS (11.58%−28.96%) and tetC (18.99%−21.57%) genes in vermicomposts, as compared to control without additives."

Zhang, L., Yang, Y., Bao, Z., Zhang, X., Yao, S., Li, Y., (2024) Plant-derived biochar amendment for **compost maturity improvement and gaseous emission reduction** in food waste composting: Insight from bacterial community and functions. Elsevier. https://www.sciencedirect.com/science/article/pii/S0045653524003503

From the Abstract: "Rice husk biochar also achieved a relatively higher reduction efficiency of methane (85.8%) and ammonia (82.7%) emissions since its greater porous structure. Besides, the growth of Pseudomonas, Pusillimonas, and Desulfitibacter was restricted to constrict nitrate reduction, nitrite respiration, and sulfate respiration by optimized temperature and air permeability, thus reducing nitrous oxide and hydrogen sulfide emissions by 48.0–57.3% by biochar addition."

Zhang, D., Zhou, H., Ding, J., Shen, Y., … Y. hong Z.-B., (2024) Potential of novel iron 1, 3, 5-benzene tricarboxylate loaded on biochar to **reduce ammonia and nitrous oxide emissions** and its associated biological mechanism during composting. Elsevier. https://www.sciencedirect.com/science/article/pii/S0960852424001275

From the Abstract: "the emissions of NH_3 and N_2O were significantly reduced by 57.2% and 37.8%, respectively, compared with those in control group (CK). Microbiological analysis indicated that BC-FeBTC addition altered the diversity and abundance of community structure as well as key functional genes. The nitrification genes of ammonia-oxidizing bacteria were enhanced, thereby promoting nitrification and reducing the emission of NH_3. The typical denitrifying bacterium, *Pseudomonas,* and critical functional genes (nirS, nirK, and nosZ) were significantly inhibited, contributing to reduced N_2O emissions."

You, X., Wang, S., International, J. C.-E., (2024) Magnetic biochar accelerates microbial succession and enhances assimilatory nitrate reduction during **pig manure composting**. Elsevier. https://www.sciencedirect.com/science/article/pii/S0160412024000552

From the Abstract: "The biochar addition accelerated assimilatory nitrate reduction and slowed dissimilatory nitrate reduction and denitrification. The Mantel test demonstrated that magnetic biochar potentially helped regulate composting nutrients and affected functional nitrogen genes."

Khedulkar, A., Pandit, B., Yu, W., Storage, R. D.-J. of E., (2024) Urchin-like NiCo hydroxide@ tamarind seed biochar for high **performance supercapacitor**. Elsevier. https://www.sciencedirect.com/science/article/pii/S2352152X24002238

From the Abstract: "U-NiCo-OH@TTBC demonstrates an impressive storage capacity of 759 F g−1 at 1 A g−1, along with a specific capacitance of 158 F g−1. The symmetric device built with U-NiCo-OH@TTBC boasts power densities ranging from 787 to 7183 W kg−1 and energy densities between 16 and 54 Wh kg−1. Most notably, the device exhibits exceptional long-term cyclic stability, retaining 92 % of its performance after 10,000 charge-discharge cycles."

Liu, D., Qian, Z., Li, Y., Luo, Y., Liu, C., & Cui, J. (2024). N, B, F – Engineered Nanocellulose – Cornstalks Aerogels for **High-Performance ORR/OER Materials**. Advanced Sustainable Systems. https://doi.org/10.1002/ADSU.202300594

From the Abstract: "enabling the facile incorporation of N, B, and F to strengthen electron transfer efficiency and synergistically guarantee bifunctional ORR activity of a half-wave potential of 0.845 V which outperforms the commercial Pt/C catalysts; moreover, it also shows an overpotential of 368 mV at 10 mA cm−2 by a maximum several or dozens of times compared to the exiting biomass-derived electrocatalysts."

Wu, Q., Wu, Y., Storage, F. R.-J. of E., (2024) Recycling and reutilizing of Pleurotus ostreatus absorbed with nano-polystyrene and vanadium ions for **aqueous supercapacitors and batteries**. Elsevier. https://www.sciencedirect.com/science/article/pii/S2352152X24004328

From the Abstract: "When the current density is 0.5 $A \cdot g^{-1}$, the specific capacitance reaches 582.6 $F \cdot g^{-1}$; at 50 $A \cdot g^{-1}$, the specific capacitance is still as high as 325 $F \cdot g^{-1}$. After 30, 000 cycles, the specific capacitance can still reach 361.6 $F \cdot g^{-1}$ at 2 $A \cdot g^{-1}$. The Coulomb efficiency is about 99 %. In addition, the electrode material can also be applied in zinc-ion batteries."

Yang, P., Han, Y., Xue, L., Gao, Y., Liu, J., … W. H.-J. of W. P., (2024) Effect of lignocellulosic biomass components on the extracellular electron transfer of **biochar-based microbe-electrode** in microbial electrochemical systems. Elsevier. https://www.sciencedirect.com/science/article/pii/S2214714424002459

From the Abstract: "The maximum power density (P_{max}) of the microbial fuel cells equipped with the biopolymer-based anode ranged between 4.5 and 4.8 W m^{-2}, setting a new record for biocarbon electrodes. The highest P_{max} was observed when the cellulose, lignin, and xylan ratios were 1:3:2 (4.80 ± 0.04 W m^{-2}). The P_{max} correlates with cellulose content more than lignin and xylan and with material capacitance more than with other parameters."

Babani, S, Hamidon, M., Ismail, A., … H. J.-J. of the A., (2024). Development and characterization of screen-printed Prosopis Africana Char thick film for **electronic applications**. Springer. https://doi.org/10.1007/s41779-024-00999-8

Baker, E. (2024). The Effect of Various **Biochar Cathodes** on the Voltage Potential, Amperage, and Capacity of an Aluminum Battery. https://scholarexchange.furman.edu/scjas/2024/all/479/

KA, V., Technology, K.-E. J. of S. S. S. and, (2024) Excellent Diffusive Performance of Cold-Plasma-Exposed Activated Peanut Shell Carbon as an **Electrode in Al-Air Batteries**. Iopscience.Iop.Org. https://iopscience.iop.org/article/10.1149/2162-8777/ad2b9d/meta

From the Abstract: "The synthesized activated Peanut shell carbon material displays remarkable supercapacitance performance in 2 M KOH at elevated specific capacitances (537 Fg^{-1} at 10 mVs^{-1}) and catalytic ability for the oxygen reduction response at a half-wave peak of 0.19 V."

Sang, J., Sun, C., Pan, J., Gao, C., Zhang, R., Jia, F., … Wang, Q. (2023). Seaweed–Modification of Si by Natural Nitrogen-Doped Porous Biochar for **High-Efficiency Lithium Batteries**. ACS Applied Materials and Interfaces. https://doi.org/10.1021/ACSAMI.3C15459

Sun, Y., Sun, P., Jia, J., Liu, Z., Huo, L., Zhao, L., (2024) Machine learning in clarifying complex relationships: Biochar preparation **procedures and capacitance characteristics**. Elsevier. https://www.sciencedirect.com/science/article/pii/S138589472401461X

From the Abstract: "the heating rate was the most important factor affecting the specific capacitance of activated biochar and showed a significant negative correlation, with a feature importance of 35.08 %. In addition, Micropore volume proportion and specific surface area showed a significant positive correlation with specific capacitance, with feature importance of 15.39 % and 9.23 %, respectively."

Wang, G., Guan, M., Fu, R., Yong, C., … Y. Z.-D. and R., (2024) Fermentation-hot pressing assisted preparation of bamboo **green-activated carbon for supercapacitors**. Elsevier. https://www.sciencedirect.com/science/article/pii/S0925963524000840

From the Abstract: "The optimized the B-ACs from densified bamboo block had a more developed pore structure (specific surface area of 2634 m2 g−1, pore volume of 1.451 cm3 g−1) and thermal stability, and

exhibited a high specific capacitance of 377.6 F g−1 at 0.5 A g−1 and high capacitance retention of 99.3 % after 2500 cycles with excellent electrochemical stability.”

Yadav, S., Ahmad, A., Priyadarshini, M., FlatChem, B. D.-, (2024) Transition towards renewable nano-carbon-based electrocatalysts in **electrochemical and bio-electrochemical technologies**. Elsevier. https://www.sciencedirect.com/science/article/pii/S2452262724000175

From the Abstract: “The incredible performance of NCE@composites assists in valuables recovery (bioelectricity, ammonia, hydrogen peroxide), biofuel generation (hydrogen production up to 3342.4 µmol g−1 h−1), emerging contaminants remediation (>90 % abatement efficiency), and wastewater treatment primarily via. HER/OER/ORR based technologies.”

🔓Allende, S., Liu, Y., Products, M. J.-I. C. and, (2024) **Electrochemical sensing of paracetamol** based on sugarcane bagasse-activated biochar. Elsevier. https://www.sciencedirect.com/science/article/pii/S0926669024002188

From the Abstract: “The SCB-activated biochar electrochemical sensor achieved significant electrocatalytic properties to detect paracetamol, showing 71% less charge transfer resistance in EIS and 96% higher electrocatalytic properties than the bare electrode based on CV curves. The linear range of paracetamol current responses demonstrated a considerable sensitivity with a 2.5 µM limit of detection.”

🔓Bartoli, M., Piovano, A., Elia, G (2024) Pristine and engineered biochar as **Na-ion batteries anode material**: A comprehensive overview. Elsevier. https://www.sciencedirect.com/science/article/pii/S1364032124000273

🔓Shi, Z., Jin, Y., Han, T., Yang, H., Gond, R., Reports, Y. S.-S., (2024) Bio-based anode material production for **lithium–ion batteries** through catalytic graphitization of biochar: the deployment of hybrid catalysts. Nature.Com. https://www.nature.com/articles/s41598-024-54509-8

From the Abstract: "Electrochemical performance evaluation showed that the trimetallic hybrid catalyst yielded bio-graphite with better electrochemical performances than those obtained through single or bimetallic hybrid catalysts, including a good reversible capacity of about 293 mAh g−1 at a current density of 20 mA/g and a stable cycle performance with a capacity retention of over 98% after 100 cycles."

🔓 Wang, Y., Wang, H., Ji, J., You, T., Lu, C., Liu, C., (2024) Hydrothermal synthesis and electrochemical properties of Sn-based peanut shell **biochar electrode materials**. Pubs.Rsc.Org. https://pubs.rsc.org/en/content/articlehtml/2024/ra/d3ra08655k

From the Abstract: "When tested at a density of current of 0.5 A g−1, the specific capacitance of SnO_2@KBC-CNTs reached 198.62 F g−1, nearly doubling the performance of the KBC electrode material alone. Moreover, the composite demonstrated a low ion transfer resistance of 0.71 Ω during charge–discharge cycles."

Zou, Y., Chen, X., Zhang, S., Zhang, B., … Y. B.-J. of, (2024) Co-applied biochar and PGPB promote maize growth and **reduce CO_2 emission** by modifying microbial communities in coal mining degraded soils. Elsevier. https://www.sciencedirect.com/science/article/pii/S0301479724002664

From the Abstract: "biochar addition provided environmental benefits in degraded coal mining soils, and the direction and magnitude of these effects are highly dependent on the presence of PGPB and the soil N level."

Gao, P., Yan, X., Xia, X., Liu, D., Guo, S., Ma, R., (2024) Effects of the three amendments on **NH_3 volatilization, N_2O emissions, and nitrification at four salinity levels**: An indoor experiment. Elsevier. https://www.sciencedirect.com/science/article/pii/S0301479724003852

From the Abstract: "Structural equation modeling indicated that biochar, manure, and gypsum affected N_2O emission by influencing soil pH, conductivity, mineral nitrogen content, and functional genes (AOA-amoA and nosZ)."

Sultan, H., Li, Y., Ahmed, W., Shah, A., … M. F.-J. of, (2024) Biochar and nano biochar: Enhancing salt resilience in plants and soil while **mitigating greenhouse gas emissions**: A comprehensive review. Elsevier. https://www.sciencedirect.com/science/article/pii/S0301479724004341

From the Abstract: "Emphasis is placed on the potential of biochar and nano-biochar to influence soil microbial activities, leading to altered emissions of GHG emissions, particularly nitrous oxide(N2O) and methane(CH4), contributing to climate change mitigation."

Zhang, A, Zhang, X., Liang, Q., one, M. S.-P., (2024) Co-application of straw incorporation and biochar addition stimulated soil **N2O and NH3 productions**. Journals.Plos.Org. https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0289300

Dai, W., Bao, Z., Meng, J., Chen, T., Innovation, W. Z.-… T. &, (2024) Biochar incorporation increases grain yield, net ecosystem **CO2 exchange, and decreases CH4 emissions** in an alternate wetting and drying paddy. Elsevier. https://www.sciencedirect.com/science/article/pii/S2352186424000531

From the Abstract: "A two-year field experiment was conducted with two irrigation regimes (I_{CF}: continuous flooding irrigation; I_{AWD}) as main plots and 0 (B_0) and 20 t ha^{-1} (B_1) biochar as subplots. I_{AWD} greatly decreased CH_4 emissions by 81.1–87.6% and yield-scaled CH_4 emissions by 81.3%–88.2% without grain yield penalty, but decreased NEE by 6.5–13.9%. The decreased NEE was mainly caused by increasing soil heterotrophic respiration (Rh) and ecosystem respiration (Re). Biochar increased grain yield by 8.1–11.3%, reduced CH_4 emissions by 25.8–38.9%, and yield-scaled CH_4 emissions by 30.4–44.6% under both irrigation regimes."

Pepeta, B., Hassen, A., Animals, E. T.-, (2024) Quantifying the Impact of Different Dietary Rumen Modulating Strategies on **Enteric Methane Emission and Productivity** in Ruminant Livestock: A Meta. Mdpi.Com. https://www.mdpi.com/2076-2615/14/5/763

Price, C., Morris, J., Policy, C. M.-E. S. &, (2024) **Biochar carbon markets**: A mitigation deterrence threat. Elsevier.
https://www.sciencedirect.com/science/article/pii/S1462901124000388

Ashraf, A., Liu, G., Arif, M., Yousaf, B., … P. A.-P. S. and, (2024) The development of plastic waste and sewage sludge co-pyrolyzed biochar composites with improved interfacial characteristics for the effective removal of **Ciprofloxacin**. Elsevier.
https://www.sciencedirect.com/science/article/pii/S0957582024001587

From the Abstract: "Efficient adsorption of CPX up to 113.97 mg/g (qms) was reported at pH 5. Pollutant removal was recorded in 12 hours of retention time due to induced π–π interactions, electrostatic and hydrophobic surface interactions highlighting chemosorption."

Attanayake, A., … A. R.-P. of, (2024) Removal of **Ciprofloxacin** from Aqueous Media Using Dendro Biochar. Journals.Sjp.Ac.Lk.
http://journals.sjp.ac.lk/index.php/fesympo/article/view/6972

Aziz, S., Anbreen, S., Iftikhar, I., Fatima, T., & … A. I.-F. in E. (2024) Green Technology: Synthesis of Iron Modified Biochar Derived from Pine Cones for **azithromycin and ciprofloxacin** removal from water. Frontiersin.Org.
https://www.frontiersin.org/articles/10.3389/fenvs.2024.1353267/full

From the Abstract: "The maximum removal percentages of azithromycin, ciprofloxacin, and their mixture were obtained as 87.8%, 91.3%, and 84%, respectively, at low pH, a low Fe-modified biochar dose, and higher temperature."

Deng, Y., Chen, J., She, A., Ni, F., Chen, W., … T. A.-J. of E., (2024) A novel Fe-loaded porous hydrothermal biochar for **removing tetracycline from wastewater**: Performance,

mechanism, and fixed-bed column. Elsevier.

https://www.sciencedirect.com/science/article/pii/S2213343724003865

From the Abstract: "FeKHC900 had the largest sorption amount of 606.52 mg/g for TC and outstanding performance for the other three antibiotics. Moreover, Fixed-bed column adsorption experiments proved that FeKHC900 has good dynamic adsorption performance (425.93 mg/g). The slightly reduced sorption amounts in different initial pH, coexisting ions, and humic acid (HA) indicated that FeKHC900 has a high resistance to interference and selective adsorption ability."

Gan, Y., Wang, Y., Dang, Y., Hao, W., & … Z. H.-A. J. of. (2024) Research on the Sustainable effect of ZnS and MoS2 decorated Biochar nanocomposites for removing quinolones from **antibiotic-polluted aqueous solutions**. CSIRO Publishing.

https://www.publish.csiro.au/CH/justaccepted/CH23170

From the Abstract: "ZnS-MoS2 activated biochar (ZMMBC) for PF, LF and NF solutions with maximum adsorption amounts of 199.42, 125.00 and 142.58 mg/g, respectively. Suggesting that ZMMBC has excellent adsorption performance. The adsorption mechanisms of PF, LF and NF molecules on ZMMBC contain complexation, pore filling, π-π interaction, electrostatic interaction and hydrogen bond interaction."

Li, S., Liu, Y., Zheng, H., Niu, J., Leong, Y., … X. D.-B., (2024) Mechanism of biochar composite (BN3Z0. 5BC) activated peracetic acid for efficient **antibiotic degradation**: Synergistic effect between free radicals and non-free radicals. Elsevier.

https://www.sciencedirect.com/science/article/pii/S096085242400155X

From the Abstract: "The prepared BC composite, named BN3Z0.5BC, efficiently activated peracetic acid (PAA), resulting in the degradation of 94.8% of sulfadiazine (SDZ) in five minutes. Compared to pure BC, the SDZ removal rate increased nearly 5-fold. Mechanism analysis revealed that the main degradation pathway involves synergism between free and non-free radicals."

Qin, Y, Wang, S., Zhang, B., Chen, W., An, M., … Z. Y.-R., (2024) Zinc and sulfur functionalized biochar as a peroxydisulfate activator via deferred ultraviolet irradiation for **tetracycline removal**. Pubs.Rsc.Org. https://pubs.rsc.org/en/content/articlehtml/2024/ra/d3ra07923f

From the Abstract: "The employed SC-Zn/PDS/UV system had excellent anti-interference under different environmental backgrounds, and compared with the removal rate of TC by adsorption of SC-Zn, the increasing rate in the SC-Zn/PDS/UV system (18.75%) was higher than the sum of the increases in the SC-Zn/PDS (9.87%) and SC-Zn/UV systems (3.34%), furtherly verifying the systematic superiority of this synergy effect."

Wu, K., Zheng, H., Du, L., Guo, A., Jiang, Y., … M. L.-J. of W. P., (2024) Magnetic biochar anchored on g-C3N4 nanosheets for the **inactivation of Staphylococcus aureus** via coupled capture and visible-light photocatalysis. Elsevier. https://www.sciencedirect.com/science/article/pii/S2214714424002241

From the Abstract: "Under visible-light irradiation, $MBC_{10}/g\text{-}C_3N_4$ composite efficiently killed *S. aureus* (>99 %), hindered the growth of new *S. aureus* biofilm, and destroyed the existing biofilm. The $MBC_{10}/g\text{-}C_3N_4$ composite sustained excellent antibacterial efficiency (>80 %) under visible light across a wide pH range (pH 4–8), and concentration range of Cl^-/SO_4^{2-} ions (0.5–1.5 mmol/L)."

Yan, J., Guo, X., Li, Q., Yuan, X., Zhang, Z., … L. T.-E., (2024) Biochar derivation at low temperature: A novel strategy for harmful resource usage of **antibiotic mycelial dreg**. Elsevier. https://www.sciencedirect.com/science/article/pii/S0013935124002809

From the Abstract: "The TC adsorption of the PMD-BCs increased from 27.3 to 46.9 mg/g with the increase of the pyrolysis temperature. Surprisingly, pH value had a strong impact on the TC adsorption, the adsorption capacity of BC-450 increased from 6.5 to 71.1 mg/g when the solution pH value increased from 2 to 10."

Yanushiya, J., Thusalini, A., & Kannan, N. (2024). Adsorptive behaviour of engineered biochar/hydrochar for **tetracycline removal** from synthetic wastewater. http://192.248.56.27:8080/jspui/handle/123456789/10115

From the Abstract: "The effects of temperature, dosage, and initial TC concentration on the adsorption process were studied for both EBC 350 and EHC 220. Acid activation improved the adsorptive performance of EHC 220 almost four times (from 1.9 to 7.5 mg/g), whereas adsorptive performance of EBC 350 improved 2.4 times from 3.8 to 9.1 mg/g."

Yi, Y., Fu, Y., Wang, Y., Cai, Y., Liu, Y., Xu, Z., (2024) Persulfate oxidation of **norfloxacin** by cobalt doped water hyacinth biochar composite: The key role of cobalt and singlet oxygen. Elsevier. https://www.sciencedirect.com/science/article/pii/S2214714424001995

From the Abstract: "The specific surface area of Co-BC was 349.00 m2/g, which was roughly 10 times greater than that of biochar (BC). NOR degradation experiment results showed that the Co-BC/PS system was able to remove 97.66 % of the NOR, which was nearly 1.57 times more efficient than that of BC/PS system."

Zeng, S., Xia, X., Miao, S., Zhang, J., Production, K. L.-J. of C., (2024) Green synthesis of highly pyrrolic nitrogen-doped biochar for enhanced **tetracycline degradation**: New insights from endogenous mineral components and organic nitrogen synergy. Elsevier. https://www.sciencedirect.com/science/article/pii/S0959652624006243

From the Abstract: "the optimal synthesis temperature for the efficient biochar-based catalyst was 800 °C. In contrast to exogenous N-doping with higher N-content (7.81 %), organic-N accelerated lattice disruption, leading to enhanced interactions with EMCs and resulting in the formation of hierarchical structures and pyrrole-N (organic-N 43.44 % > exogenous-N 17.67 %)."

Zhang, J., Yang, L., Liu, C., Ma, J., Yan, C., … S. M.-S. and, (2024) Efficient **degradation of tetracycline** hydrochloride wastewater by microbubble catalytic ozonation with sludge

biochar-loaded layered polymetallic hydroxide. Elsevier.

https://www.sciencedirect.com/science/article/pii/S1383586624005069

From the Abstract: "The removal efficiencies of TCH and TOC under optimal conditions were 98.3 % and 59.6 % within 90 min in MB/O3/SBC-LDH process, respectively. The reactive oxygen species (ROS) oxidation enhanced in MB/O3/SBC-LDH process played a major role in efficient TCH removal, especially •O2– and 1O2."

Fan, W., Yang, T., Wu, Y., Xu, J., Wu, D., Zhu, X., … Li, D. (2024). Sulfuric acid–assisted ball milling for the preparation of Si–O-enriched straw biochar: removal efficiency of **rhodamine B** and adsorption mechanism. Environmental Science and Pollution Research. https://doi.org/10.1007/S11356-024-32466-Z

From the Abstract: "the adsorption rate of Ac-BC^{bm} on RhB was up to 94.9%, which was 60.5% and 55.8% higher than that of ball-milling straw (ST^{bm}) and biochar prepared by pyrolysis (STBC600), respectively. The Ac-BC^{bm} had better adaptability under different pH and common interfering ions for remove RhB."

Liu, J., Wen, J., Hu, J., Ma, Y., Wang, X., & Li, H. (2024). Functionalized typha biochar for **antibiotic removal** via low-carbon integrated method: Performance and mechanism analyses. CLEAN – Soil, Air, Water. https://doi.org/10.1002/CLEN.202300179

From the Abstract: "Compared with the biochar prepared by a conventional two-step carbonization and activation method (TBTK), the TBIK preparation process reduced energy consumption by 43849.58 J and cut carbon dioxide emissions by 32.80%. TBIK exhibited a large surface area of 1252.40 m2/g and rapidly achieved an equilibrium removal efficiency of 99.95% within 20 min for simulated antibiotics wastewater."

Liu, L., Shang, D., Zhao, Y., Zhao, Q., Guo, Y., Zhang, F., … Zhao, C. (2024). Preparation of Chladophora-Based Biochar and Its **Adsorption Properties for Antibiotics**. ChemistrySelect, 9(8). https://doi.org/10.1002/SLCT.202303598

From the Abstract: “The pore filling and electrostatic interaction were considered the main mechanism for the adsorption of pharmaceuticals and personal care products on CB, whereas the π-π electron donor acceptor (EDA) interaction and hydrogen bond would also partially contribute to the adsorption process.”

Maldonado-Carmona, N., Piccirillo, G., Godard, J., Heuzé, K., Genin, E., Villandier, N., … Leroy-Lhez, S. (2024). Bio-based matrix photocatalysts for **photodegradation of antibiotics**. Photochemical & Photobiological Sciences. https://doi.org/10.1007/S43630-024-00536-3

Wang, F., Mei, Z., He, C., Fu, Y., Virta, M., & Liao, M. (2024). Characterization of antibiotic resistomes and pathobiomes of **soil antibiotic-degrading microbial** by stable isotope probing and metagenomics. https://doi.org/10.21203/rs.3.rs-3947784/v1

Wang, B., Chen, Y., Li, W., Liu, Y., Xia, X., Xu, X., (2024) Magnetic phytic acid-modified kapok fiber biochar as a novel sorbent for **magnetic solid-phase extraction of antidepressants** in biofluids. Elsevier. https://www.sciencedirect.com/science/article/pii/S0003267024000965

From the Abstract: “By combining with liquid chromatography-ultraviolet (LC-UV), a quantitative method with good linearity (R2 > 0.993) and relative recoveries (92.4–107.7%) and negligible matrix effect (−11.5–6.0%) was developed. The Fe3O4/PAKFBC successfully detected six antidepressants in plasma and urine samples, requiring no pH adjustment with buffer salts.”

Wang, Y.-Z., Li, H., Chen, Q.-L., Pan, T., Zhu, Y.-G., Springael, D., & Su, J.-Q. (2024). Prevention and control strategies for **antibiotic resistance**: from species to community level. Springer, 6(3). https://doi.org/10.1007/s42832-023-0222-2

Wang, Y, Xu, S., Wang, Q., Hu, K., Zhang, H., … J. C.-S. and, (2024) **Tetracycline removal** from aqueous solution by magnetic biochar modified with different iron valences: A comparative study. Elsevier. https://www.sciencedirect.com/science/article/pii/S1383586624003538

From the Abstract: "TC adsorption capacity (q_m) followed the sequence: Fe^{6+}-BC (37.95 mg·g^{-1}) > Fe^{2+}-BC (31.89 mg·g^{-1}) > Fe^{0}-BC (25.36 mg·g^{-1}) > Fe^{3+}-BC (19.63 mg·g^{-1}) > BC (11.06 mg·g^{-1}). Fe^{6+}-BC exhibited excellent TC adsorption capacity with the best separation performance, which was attributed to its high iron-loading and large surface area from strong corrosiveness during pyrolysis. Mechanistic analysis revealed that pore filling, π–π interactions, complexation, and hydrogen bonding mainly contribute to TC adsorption by Fe-BCs."

Xiaolu, X., Tian, A., Lei, Z., & Jing, X. (2024). Enhanced **adsorption of hydroquinone** by transition metals and heteroatom-codoped biochar: Preparation, performance, and mechanism. https://doi.org/10.21203/rs.3.rs-3862714/v1

From the Abstract: "The maximum adsorption capacities of BCNP-Fe, BCHNP-Fe, and BCP-Fe were 154.321, 203.666, and 142.045 mg/g, respectively, which were 1.09, 1.44 and 1.00 folds of BC."

Yang, S., Yang, C., Hu, X., Ding, Z., Zhou, R., Wei, H., & Wang, L. (2024). Aqueous **norfloxacin removal** by novel biochar adsorbent prepared through ethanol-combined ball milling. Taylor & Francis, 36(1). https://doi.org/10.1080/26395940.2024.2311675

From the Abstract: "The adsorption capacity of C2H6O-BC was 163 mg·g−1, and about 72% of the equilibrium adsorption capacity could be reached within 60 min. The electrostatic interaction was not the dominant mechanism when initial pH was lower than 8.00."

Zhang, X, Hou, J., Zhang, S., Cai, T., Liu, S., Hu, W., (2024) Standardization and micromechanistic study of **tetracycline** adsorption by biochar. Springer. https://link.springer.com/article/10.1007/s42773-023-00299-7

From the Abstract: "with increases in the degree of carbonization, the tetracycline adsorption capacity of biochar increased from 16.08 mg L−1 to 98.35 mg L−1. The adsorption energy exhibited a strong correlation with the aromatic condensation of biochar at $p \leq 0.01$, with a linear relationship ($r2 \geq 0.94$). For low carbonization degrees, the adsorption of tetracycline by biochar was primarily driven by chemical bonds (69.21%) and complemented with electrostatic interactions, weak van der Waals forces or π-π interactions. For high carbonization degrees, the synergistic effects of hydrogen bonding, van der Waals forces, and π-π interactions determined the adsorption of tetracycline on biochar (91.1%)."

Zhang, X, Yin, T., Chen, Z., Long, Y., Jiang, J., … S. Z.-A. S., (2024) Mechanisms and influences on the formation of electron-transfer complexes in the activation of N, B co-doped graphitic biochar for **peroxydisulfate degradation of oxytetracycline**. Elsevier. https://www.sciencedirect.com/science/article/pii/S0169433224003489

From the Abstract: "The adsorptive removal rate was 53 % in 30 min, and the degradation rate was 94.14 % in 15 min, with a reaction rate constant of 0.1363 min−1 (k0- 15min), which was higher than the degradation rate(47 %) in 15 min for N-rGO with an energy barrier of 0.215 eV."

Zhao, Z, Li, P., Zhang, M., Feng, W., Research, H. T.-E., (2024) Unlocking the potential of Chinese herbal medicine residue-derived biochar as an efficient adsorbent for high-performance **tetracycline removal**. Elsevier. https://www.sciencedirect.com/science/article/pii/S0013935124003293

From the Abstract: "the maximum adsorption capacity (930.3 mg g^{-1}) of TC on HAR@$ZnCl_2$ can be achieved when the adsorbent dosage is 0.5 g L^{-1} and C_0 is 500 mg L^{-1} at 323 K. The TC adsorption on HAR@$ZnCl_2$ took place spontaneously."

Zulfiqar, N., Nadeem, R., Omega, O. M.-A., & 2024, U. (2024). Photocatalytic Degradation of Antibiotics via Exploitation of a Magnetic Nanocomposite: A Green Nanotechnology Approach toward **Drug-Contaminated Wastewater**. ACS Publications. https://pubs.acs.org/doi/abs/10.1021/acsomega.3c08116

From the Abstract: "The maximum efficiencies of percentage degradation for ciprofloxacin and amoxicillin were found to be (73.51%) > (63.73%) > (54.57%) and (74.07%) > (61.55%) > (50.66%) for magnetic nanocomposites, biochar, and magnetic nanoparticles, respectively."

Silva, N., Valenga, M., … G. O.-J. of T., (2024) Voltametric **Determination of Dopamine** in Urine Samples Using Biochar-Modified Carbon Paste yielded from Spent Coffee Grounds. Iopscience.Iop.Org. https://iopscience.iop.org/article/10.1149/1945-7111/ad2d8b/meta

Brar, B., Saharan, B., Seth, C., Kamboj, A., … K. B.-B. and, (2024) Nanobiochar: Soil and plant interactions and their implications for **sustainable agriculture**. Elsevier. https://www.sciencedirect.com/science/article/pii/S1878818124000604

Chen, H., Hao, Y., Ma, Y., Wang, C., Liu, M., Geoderma, I. M.-, (2024) Maize straw-based **organic amendments and nitrogen fertilizer** effects on soil and aggregate-associated carbon and nitrogen. Elsevier. https://www.sciencedirect.com/science/article/pii/S0016706124000491

> **From the Abstract:** "Biochar resulted in the largest increase in SOC contents and improved soil aggregation without N fertilization, but fertilization greatly decreased these responses. The majority of the accumulated C and N occurred in the total silt + clay fractions, making up 50–90 % of total SOC and 79–96 % of total TN."

GOWTHAMI, B., & ANGRAU, P. G.-T. J. of R. (2023**). RHIZOSPHERE MICROBIOME, SOIL ENZYMES AND GROUNDNUT YIELD** AS INFLUENCED BY ADDITION OF BIOCHAR AND FERTILIZERS IN IRRIGATED ALFISOL OF NORTH COASTAL ANDHRA PRADESH. Epubs.Icar.Org.In, 51(4), 43–52. https://doi.org/10.58537/jorangrau.2023.51.4.06

> **From the Abstract:** "The highest drymatter accumulation of 2951 kg ha-1 at peg penetration and 6428 kg ha-1 at pod development was observed in T5 (100% RDF + biochar @ 6 t ha-1) which was on par with T3 (100% RDF + biochar @ 2 t ha-1), T4 (100% RDF + biochar @ 4 t ha-1), T8 (75% RDF + biochar @ 6 t ha-1) treatments. Groundnut pod yield was highest (4019.58 kg ha-1) in treatment received 100% RDF + biochar

@ 6 t ha-1, which was on par with T4 (100% RDF + biochar @ 6 t ha-1) and T8 (75% RDF + biochar @ 6 t ha-1)."

Kong, L., Wang, Y., Xiang, X., Zhou, L., Innovation, P. Z.-... T. &, (2024) Study on the impact of hydraulic loading rate (HLR) on **removal of nitrogen** under low C/N condition by modular moving bed constructed wetland (MMB-CW) system. Elsevier. https://www.sciencedirect.com/science/article/pii/S2352186424000555

From the Abstract: "there are no significant differences in TN removal among the three systems at 250 mm/d and 500 mm/d. NH_4^+-N and NO_3^--N removal rates don't significantly decrease ($p>0.05$). High HLR leads to significantly lower effluent NO_2^--N concentrations. HLR minimally affects COD_{Cr} removal, with unit C exhibiting better resistance."

Lin, Y., Cai, Q., Chen, B., & Garg, A. (2024). A Review of the N**egative Effects of Biochar on Soil in Green Infrastructure** with Consideration of Soil Properties. Indian Geotechnical Journal. https://doi.org/10.1007/S40098-024-00875-Z

From the Abstract: "Biochar's hydrophobicity, dictated by its feedstock and pyrolysis temperature, can increase soil water repellency and reduce water retention ability. Additionally, excessive biochar can clog soil pores and absorb vital nutrients like phosphorus, manganese and calcium, hindering water and nutrient exchange and thereby restricting growth of vegetation. Moreover, while excessive biochar negatively impacts soil cation exchange capacity (CEC) by capturing key cations, biochar from pretreated biomass can improve CEC without causing alkalization."

Matisic, M., Dugan, I., Kisic (2024) Three-year investigation of **tillage and organic amendment management** on the crop and biomass yields in Croatia. Croris.Hr. https://www.croris.hr/crosbi/publikacija/prilog-skup/820802

Meng, J., Di, Y., Geng, Y., Li, W., Huo, R., Technology, S. Z.-B., (2024) Enhanced **nitrate removal efficiency and microbial response** of immobilized mixed aerobic denitrifying bacteria through biochar coupled with inorganic electron donors in oligotrophic water. Elsevier. https://www.sciencedirect.com/science/article/pii/S0960852424001603

From the Abstract: "BIADB effectively remove 50.13 ± 2.82 % (25℃), and 42.16 ± 3.22 % (10℃) nitrate."

Pontius, J., McIntosh, A., of, A. M.-E. P. S. in an A., (2024) Regenerative Agriculture. Springer, 135–147. https://doi.org/10.1007/978-3-031-48762-0_11

Ravishani, B., … K. J.-P. of, (2024) Biochar Derived from Pond Apple (Annona glabra) as a Fertilizer to **Enhance the Crop Yield**: A Sustainable Approach. Journals.Sjp.Ac.Lk. http://journals.sjp.ac.lk/index.php/fesympo/article/view/7134

From the Abstract: "An optimizing process was carried out by increasing the amount of biochar (5%, 7%, 10% by weight) to determine the ideal amount of biochar on plant growth. Considering the average growth rate, the best result (21.43±1.01%) was shown in pot treated with 7% biochar by weight."

Science, M. K.-E. J. of S., (2024) **Improving crisphead lettuce productivity grown** under water deficit conditions through biochar and zeolite soil amendments, coupled with foliar stimulant applications. Journals.Ekb.Eg. https://journals.ekb.eg/article_341284.html

Sheffield, S., Hoefer, T., & Systems, J. P.-F. in S. F. (2024) Biochar has positive but distinct impacts on **root, shoot, and fruit production in beans, tomatoes, and willows**. Frontiersin.Org. https://www.frontiersin.org/articles/10.3389/fsufs.2024.1346529/full

Shivangi, S., Singh, O., Shahi, U., … P. S.-E. J. of, (2024) Carbon Sequestration through **Organic Amendments, Clay Mineralogy and Agronomic Practices**: A Review. Journals.Ekb.Eg. https://journals.ekb.eg/article_341063.html

From the Abstract: "Soil carbon has been lost as a result of inadequate crop and soil management strategies. Over the world, 456 Pg of soil carbon is stored in dead organic matter and above-ground vegetation, compared to 1417 Pg in the first metre of soil. The agricultural sector is accountable for 25-30% of total worldwide greenhouse gas (GHG) emissions in the form of CO2, N2O, and CH4."

Sulaiman, S., Hernandez-Ramirez, G., Sulaiman, Z., Liew, K., Navaranjan, N., Brunei, T., … Darussalam, B. (2023). The effect of biochar from plant materials on **agricultural acid sulfate soil**: a laboratory incubation. Ajstd.Ubd.Edu.Bn. https://ajstd.ubd.edu.bn/journal/vol40/iss2/7/

From the Abstract: "The application of biochar significantly increased (P < 0.05) soil pH by 0.4-0.6 units as well as the soil available P by 13.1 mg kg-1 relative to the control. The soil exchangeable Al was significantly reduced (by 2.4 cmol kg-1 when compared with the control treatment."

Thapa, S. (2024). Assessing the Impact of Pyrolysis Biochar Derived from Sewage Sludge on **Growth Responses and Plant Compatibility** across Various Plant Species. https://opus4.kobv.de/opus4-rhein-waal/frontdoor/index/index/docId/1888

From the Abstract: "biochar does not adversely affect seed germination. Root analysis revealed biochar-induced fine root proliferation, suggesting enhanced nutrient availability for plants. In the context of Rhizobium inoculation, common beans in the biochar medium have exhibited smaller dimensions, influenced by the interaction between biochar and Rhizobium inoculation rates."

Wijeysingha, I., International, D. L.-P. of, (2024) Impact of Different Types of Soil Amendments and Their Hydrophobicity on **Soil Aggregate Formation**. Journals.Sjp.Ac.Lk. http://journals.sjp.ac.lk/index.php/fesympo/article/view/7060

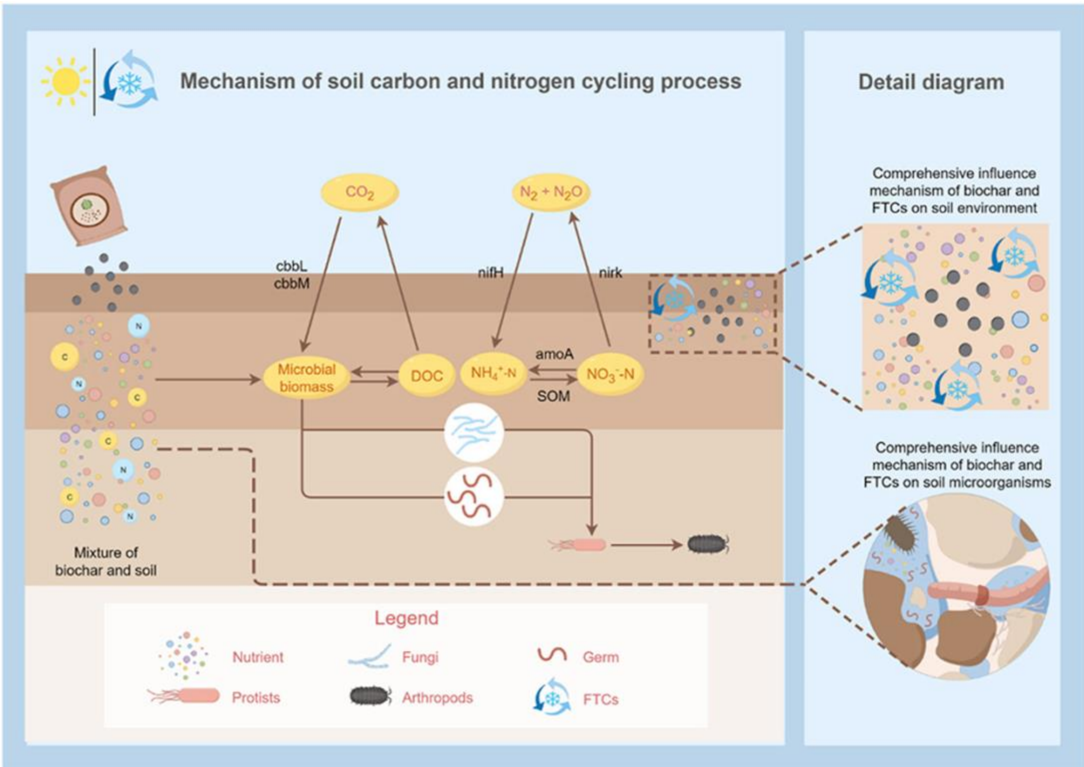
From the Abstract: "the addition of hydrophobic litter material enhanced the formation of soil aggregates. Hydrophobic organic components in CE might be the reason for the enhanced aggregate formation at each time interval. Besides the hydrophobicity, inorganic ions, especially Ca2+, increased soil aggregate formation."

Yang, W., Wang, Z., Zhao, H., Li, D., Jia, H., Plant, W. X.-, & Environment, S. and. (2024) Biochar application influences the **stability of soil aggregates and wheat yields**. Ideas.Repec.Org. https://ideas.repec.org/a/caa/jnlpse/vpreprintid199-2023-pse.html

From the Abstract: "Biochar application alone and the application of both biochar and nitrogen fertiliser were associated with 6.4-20.2% and 20.7-42.7% increases in spring wheat yields, respectively."

Zhang, Y., Hou, R., Fu, Q., Li, T., Li, M., … S. D.-J. of C., (2024) **Soil environment, carbon and nitrogen cycle** functional genes in response to freeze-thaw cycles and biochar. Elsevier. https://www.sciencedirect.com/science/article/pii/S0959652624007923

From the Abstract: "



Adekiya, A., Ayorinde, B., Alori, E., … O. A.-A., (2024) Effect of Biochar on **Growth, Nodulation, Yield and Soil Properties** of Cowpea. Acs.Agr.Hr. https://acs.agr.hr/acs/index.php/acs/article/view/2407

From the Abstract: "The yield of cowpea was increased from 0 to 10 t ha-1 biochar rate. Using the means of the two years, relative to the control, application of biochar at 10, 7.5, 5, and 2.5 t ha-1 increased the pod weight of cowpea by 217, 118, 73 and 33%, respectively."

Alixandre, R., Lima, P., … T. A.-B. J. of, (2024) Potential of coffee straw biochal as a substrate conditioner in seed lettuce and **sorghum germination and vigority**. SciELO Brasil. https://www.scielo.br/j/bjb/a/PjRXksjSvgKC5SzHJFq65yS/?lang=en

From the Abstract: "For the germination speed index, sorghum seeds have higher means, except for the treatment with the addition of 15% coffee straw biochar. Lettuce seeds have higher shoot length averages, except for treatment with 100% commercial substrate. The sorghum seeds have higher mean root length and dry mass than lettuce, regardless of the treatment."

Asirifi, I. (2024). Biochar and other indigenious additives for **improving soil fertility** in Ghana's savanna. http://hss-opus.ub.ruhr-unibochum.de/opus4/frontdoor/index/index/docId/10904

Atakpa, E. O., Yan, B., Okon, S. U., Liu, Q., Zhang, D., & Zhang, C. (2024). Asynchronous application of modified biochar and exogenous fungus Scedosporium sp. ZYY for **enhanced degradation of oil-contaminated intertidal mudflat sediment**. Environmental Science and Pollution Research. https://doi.org/10.1007/S11356-024-32419-6

Daghighi, E., Ayugi, V., Poverty, E. D.-… S. A., (2024) Better Soils for **Resilient Agricultural Production**. Journalasap.Org. https://journalasap.org/index.php/asap/article/view/33

From the Abstract: "soil management, compost, biochar, and agroforestry – can unlock the potential of soils to restore soil organic matter, to protect soil fertility and biodiversity, and to sequester CO2 for the future build-up of humus in agricultural soils. Better soils can promote economic growth and development, especially in low-income countries hit hardest by climate change."

Ghassemi-Golezani, K., Mousavi, S. A., & Farhangi-Abriz, S. (2024). Enriched biochars with silicon and calcium nanoparticles **mitigated salt toxicity and improved safflower plant performance**. International Journal of Phytoremediation, 1–10. https://doi.org/10.1080/15226514.2024.2321167

From the Abstract: "Salt stress increased sodium content, reactive oxygen species generation, and antioxidant enzymes activity, but decreased potassium, calcium, magnesium, iron, zinc, silicon, photosynthetic pigments, leaf water content, and seed yield (by about 36%) of safflower plants. The addition of biochar forms to the saline soil improved growth (up to 24.6%) and seed yield (up to 37%) of safflower by reducing sodium accumulation (by about 32%) and ROS generation and enhancing nutrient uptake, photosynthetic pigments, and water contents of leaves."

Ibraheem, Taymaa, Hajabbasi, M. A., & Shariatmadari, H. (2024). Effects of Biochar and Municipal Solid Waste Compost on **Soil Physical Quality and Productivity Index** Under Sorghum Cultivation Irrigated with Saline Water. Communications in Soil Science and Plant Analysis, 1–12. https://doi.org/10.1080/00103624.2024.2319799

Kwoczynski, Z., Burdová, H., Souki, K. Al, Horticulturae, J. Č.-S., (2024) Extracted rapeseed meal biochar combined with digestate as a **soil amendment**: Effect on lettuce (Lactuca sativa L.) biomass yield and concentration of bioavailable element fraction in the soil. Elsevier. https://www.sciencedirect.com/science/article/pii/S0304423824002000

Li, Y., Zhang, S., Fang, Y., Hui, D., … C. T.-A. and F., (2024) **Nitrogen deposition-induced stimulation** of soil heterotrophic respiration is counteracted by biochar in a subtropical forest. Elsevier. https://www.sciencedirect.com/science/article/pii/S0168192324000558

From the Abstract: "Nitrogen deposition stimulated soil RH by 8.1–9.8 % annually over three years compared to the control, and this stimulation was mitigated (by 8.1–8.9 % annually) with biochar addition. In the context of N deposition, the decrease of soil RH by biochar application was not through changing soil temperature, moisture or labile organic carbon content."

Mohamadi, S., … F. S.-Z.-A., (2024) The effects of **silicon and some nutrients recovered** from plant residues on their concentration in soil. Agrieng.Scu.Ac.Ir. https://agrieng.scu.ac.ir/article_18930.html?lang=en

From the Abstract: "The results showed that the biochar treatment of rice straw had the maximum amount of pH (7.66), organic carbon (2.61%), nitrogen (0.24%), phosphorus (46 mg/g), potassium (781 mg/g) and silicon (261.33 mg/g) compared to other treatments. Also, the results of the compare means showed that sugarcane bagasse biochar treatment had the maximum amount of manganese (25.01 mg/kg), zinc (3.20 mg/kg), iron (48.27 mg/kg) and copper (2.20 mg/kg) compared to other treatments."

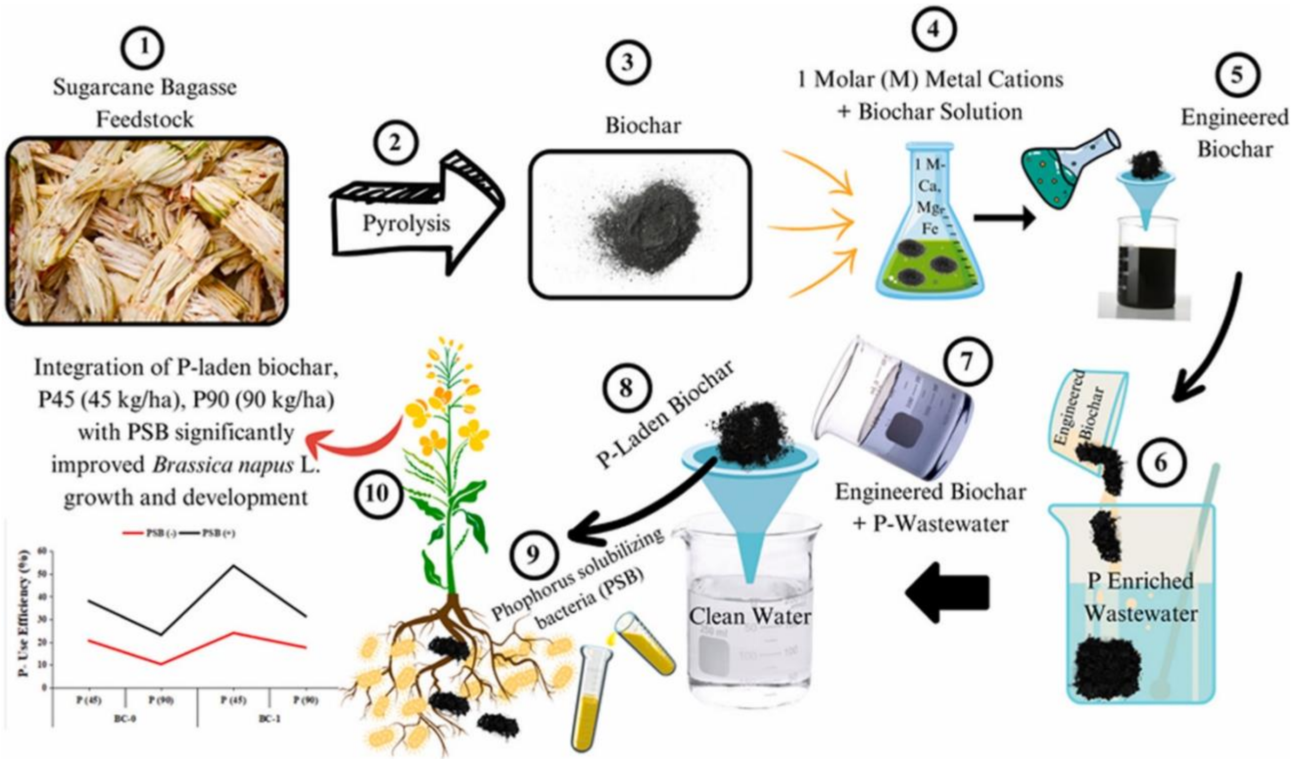
Molina-Balmaceda, A., Rojas-Candia, V., Arismendi, D., & Richter, P. (2024). Activated carbon from avocado seed as **sorbent phase for microextraction technologies**: activation, characterization, and analytical performance. Analytical and Bioanalytical Chemistry. https://doi.org/10.1007/S00216-024-05203-1

From the Abstract: "By using this AC as the sorbent phase, the optimal extraction conditions in RDSE were as follows: the use of 50 mg of sorbent in the disk, 30 mL of sample volume, pH 4, 90 min of extraction time at a rotation velocity of the disk of 2000 rpm, and methanol as the elution solvent. The extracts were analyzed via gas chromatography coupled to mass spectrometry (GC–MS). The method provided limits of detection of 0.23 and 0.07 μg L−1 and recoveries of 81% and 91% for Ibu and 1-OH-Ibu, respectively."

Ngoc Linh, V., Thu Phuong, N., Phuong Thu, L., Thi Mai Thanh, D., & Hong Nam, N. (2024). Physico-chemical properties of macadamia nut shell **post-gasification residues and potential agricultural application**. Vjs.Ac.Vn, 62(1), 58–67. https://doi.org/10.15625/2525-2518/18001

Qadir, M., Naveed, M., Khan, K., Mumtaz, T., Chemosphere, T. R.-, (2024) Divergent responses of phosphorus solubilizing bacteria with P-laden biochar for enhancing **nutrient recovery, growth, and yield of canola** (Brassica napus L.). Elsevier. https://www.sciencedirect.com/science/article/pii/S0045653524004582

From the Abstract: "phosphorous solubilizing bacteria (PSB) were incorporated with PL-BCsb along two P fertilizer levels P45 (45 kg ha−1) and P90 (90 kg ha−1) for evaluation of phosphorus reuse efficiency. Integrated application of PL-BCsb with half of the suggested amount of P45 (45 kg ha−1) and PSB increased growth, production, physiological, biochemical, and nutritional qualities of canola by almost two folds when compared to control."



Torres, G., Amorim, R., Raimo, L., … O. F.-R., (2024) **Water retention** in sandy soils of different origins with the addition of biochar. SciELO Brasil. https://www.scielo.br/j/rcaat/a/dVrGhsrpRhyWHNzZpc7xZPR/

From the Abstract: "the application of biochar increases the microporosity (86.7% with cotton husks biochar and 67.9% with filter cake biochar) and reduces the microporosity of sandy soils (38.2% with cotton husks biochar and 36.0% with filter cake biochar); also, there was a higher increase in water availability with biochar from cotton husks (57.1%).”

Wen, Y., Xu, T., Qi, D., Chang, W., Li, K., Fang, X., … Song, F. (2024). Rhizophagus irregularis combined with biochar can improve **the saline-alkali tolerance and energy quality** of switchgrass through osmoregulation and salt-tolerance gene expression. https://doi.org/10.21203/rs.3.rs-3987212/v1

From the Abstract: “The biomass of switchgrass in Ri combined with biochar treatment group was significantly higher than that in single treatment group (P < 0.05); (2) Ri combined with biochar increased the activity of antioxidant enzymes and the accumulation of osmoregulatory substances, and affected the synthesis of plant hormones; (3) Combined treatment significantly increased the contents of K+, Ca2+ and Mg2+ in leaves and roots, decreased the contents of Na+, and maintained high K+/Na+, Ca2+/Na+ and Mg2+/Na+.”

Yoo, S. (2024). The Effect of Nutrient Solutions on Improving **Soil Fertility and Sustainable Agriculture** of Martian Regolith Simulants. https://scholarexchange.furman.edu/scjas/2024/all/463/

Roofchaee, A., Abrishamkesh, S., … M. F.-J. of S. and, (2024) Optimizing biochar application: Effects of placement method, particle size, and application rate on **soil physical properties and soil loss**. Springer. https://link.springer.com/article/10.1007/s11368-024-03741-w

From the Abstract: “The relative decrease in runoff (462 vs. 356%) and soil loss (52 vs. 23%) in biochar-treated soils compared to the control treatment were considerably higher in the slurry than commix method. The results also demonstrated a significant interaction between the biochar placement method and treatment type regarding soil loss characteristics in both commixing and slurry methods.”

Rostami, K., Khanlari, Z. V., and, M. Z.-I. J. of S., (2024) The effect of different biochars on the concentration of **organic carbon, nitrogen, phosphorus and enzyme activity** of a sandy loam soil. Ijswr.Ut.Ac.Ir. https://ijswr.ut.ac.ir/article_95882_en.html

Sheikhi, J., Mirsyed Hosseini, H., Etesami, H., & Majidi, A. (2024). Biochar Versus Crop Residues: Modulating Net **Nitrogen Mineralization-Immobilization and Lowering Nitrification** in Calcareous Soils. Journal of Soil Science and Plant Nutrition. https://doi.org/10.1007/S42729-024-01655-7

From the Abstract: "The application of biochar was associated with an increase in soil microbial respiration relative to the control; nevertheless, this rate of respiration was considerably lower than that observed in soils treated with plant residues. Lastly, while plant residues stimulated an increase in nitrifying bacteria populations, biochar did not significantly impact these bacterial populations when compared to the control soil."

Yang, Y., Kang, Z., Wang, J., Xu, G., Materials, Y. Y.-J. of H., (2024) Simultaneous achievement of removing **bensulfuron-methyl and reducing CO2** emission in paddy soil by Acinetobacter YH0317 immobilized boron-doping biochar. Elsevier. https://www.sciencedirect.com/science/article/pii/S0304389424003376

From the Abstract: "*Acinetobacter* YH0317 immobilized BBC reduced the CO_2-equivalent emission by 41.0%. Metagenomic sequencing results revealed that the decreasing CO_2 emission in TP5 was correlated with carbon fixation gene (*fhs*), indicating that *fhs* gene may play an important role in reducing CO_2 emission."

Yin, X., Zhao, L., Fang, Q., Zi, R., Fang, F., Yang, X., (2024) Effects of biochar amendment on the surface and **underground runoff and soil loss** of karst slopes at the microplot scale. Elsevier. https://www.sciencedirect.com/science/article/pii/S0341816224000559

From the Abstract: "The rates of subsurface runoff (SF) and underground leakage runoff (UFR) decreased significantly after biochar application compared with CK ($P < 0.05$). The mean UFR rate of CK was 1.6–31.5

times higher than that of T1, T2 and T3, suggesting that biochar application increased surface runoff while decreasing underground runoff. SR accounted for the largest proportion of total runoff (18–88 %), followed by SF (3–30 %) and UFR (1–18 %), which depended on biochar application rates and rainfall events."

Zang, X., Ren, J., Liu, J., Cao, T., Chi, J., Zhu, X., (2024) Is non-legume green manure rotation or straw biochar more effective in promoting **peanut production**? Elsevier. https://www.sciencedirect.com/science/article/pii/S0929139324000489

From the Abstract: "They also increased water-stable aggregates measuring >5 mm and 2–5 mm, while decreasing aggregates measuring 0.25–2 mm, 0.053–0.025 mm, and < 0.053 mm when compared to PT. Additionally, GM and BC improved soil mean weight diameter and geometric mean diameter."

Bhawariya, A., Lal Sunda, S., & M, G. P. (2024). Comprehensive review on **utilization of biochar** in agriculture. Researchgate.Net, 40(01). https://www.researchgate.net/profile/Akshika-Bhawariya/publication/378143434_Comprehensive_review_on_utilization_of_biochar_in_agriculture/links/65c9b5b41e1ec12eff884f33/Comprehensive-review-on-utilization-of-biochar-in-agriculture.pdf

Dong, H., Leung, A. K., Liu, J., Chen, R., & Lui, W. (2024). Microstructural investigation of the unsaturated hydraulic properties of **hydrochar-amended soils**. Acta Geotechnica. https://doi.org/10.1007/S11440-024-02254-7

Geng, H., Wang, F., Wu, H., Qin, Q., Ma, S., … H. C.-J. of H., (2024) Biochar and nano-hydroxyapatite combined remediation of soil surrounding tailings area: multi-metal (loid) s fixation and soybean **rhizosphere soil microbial improvement**. Elsevier. https://www.sciencedirect.com/science/article/pii/S0304389424003960

From the Abstract: “The synergistic effect of the two amendments decreased the acid-soluble contents of Co, Cu, Fe, and Pb in rhizosphere soils up to 86.75%, 80.69%, 89.09%, and 96.70%, respectively. The ameliorant reduced the accumulation of metal(loid)s in soybean plants, and rhizosphere microorganisms inhibited the migration of soil metals to plants. Additionally, biochar and nHAP regulated the rhizosphere soil microbial community. The rhizosphere soil of the sterilization group tended to prioritize the restoration of the original dominant bacteria.”

Guo, R., Qian, R., Du, L., Sun, W., Wang, J., … T. C.-A. W., (2024) Straw-derived biochar optimizes water consumption, shoot and root characteristics to **improve water productivity of maize under reduced nitrogen**. Elsevier. https://www.sciencedirect.com/science/article/pii/S037837742400057X

From the Abstract: “The maximum GYs were achieved with SIN300 and BIN225, respectively. Notably, compared with SIN300, BIN225 significantly enhanced GY by 10.8% and 5.8% and improved WP by 19.2% and 9.9% (P < 0.05).”

Jalal, F., Akhtar, K., Saeed, S., Said, F., Khan, Z. H., Hussain, S., … Fahad, S. (2024). Biochar as sustainable input for nodulation, **yield and quality** of mung bean. Journal of Umm Al-Qura University for Applied Sciences. https://doi.org/10.1007/S43994-024-00121-5

From the Abstract: “The nodule density (17.8), pods plant−1 (27.3), grains pods−1 (11.4) and biological yield (6497 kg ha−1) produced best results under the application of 30 t ha−1 of biochar. Moreover, grain yield (1550 kg ha−1), grain nitrogen content (25.2 g kg−1) and straw nitrogen content (15.3 g kg−1) also resulted best under 30 t ha−1 biochar. While, 1000 grain weight (64 g) was recorded highest weight under 20 t ha−1.”

Reports, A. A.-S., (2024) Impact of some amendments on kinetics of leaching **dissolved organic carbon and ammonium** in calcareous sandy soil under vinasse addition. Nature.Com. https://www.nature.com/articles/s41598-024-54420-2

From the Abstract: "it is recommended not to add vinasse alone to sandy soils, but it is preferred to be co-applied with BC amendment at the level of 4% better than ZL and WCB."

Si, Y., Ma, Y., Chen, H., Ge, F., Ma, H., Gao, R., (2024) Biochar mediates **nitrogen investment strategy** involved in Chinese fir growth as revealed by molecular information on soil dissolved organic matter. Elsevier. https://www.sciencedirect.com/science/article/pii/S001670612400051X

Abdelfattah, A., & Mostafa, H. (2024). Potential of Soil Conditioners to **Mitigate Deficit Irrigation Impacts** on Agricultural Crops: A Review. Water Resources Management. https://doi.org/10.1007/S11269-024-03800-4

From the Abstract: "Three main types of soil conditioners are covered: bentonite, biochar, and super-absorbent polymers. Mechanisms associated with effects of each conditioner to enhance soil water retention is highlighted as well."

Adhikari, S., Moon, E., Production, W. T.-J. of C., (2024) Identifying biochar production variables to **maximise exchangeable cations and increase nutrient availability** in soils. Elsevier. https://www.sciencedirect.com/science/article/pii/S0959652624009028

From the Abstract: "biochar prepared from mixed garden wastes can increase K+ or Ca2+ in loamy or sandy soils and mitigate potential soil sodicity problems in loamy soils. However, a clayey soil may or may not need biochar for the specific purpose of increasing exchangeable cations."

Ahmad, S., Zhai, X., Wang, M., Shi, Y., Chen, Y., Liang, Q., … Wen, R. (2024). **Biochar amendments improve** soil functionalities, microbial community and reduce Pokkah boeng disease of sugarcane. Chemical and Biological Technologies in Agriculture, 11(1). https://doi.org/10.1186/S40538-024-00546-4

From the Abstract: “The application of 15 t ha−1 biochar significantly increased available phosphorus (AP) and ammonium nitrogen (NH4+–N) by 209.93 mg kg−1 and 12.1 mg kg−1, while the application of 30 t ha−1 of biochar significantly increased 241.04 mg kg−1 of available potassium (AK) (P < 0.05).”

Bao, Z., Dai, W., Su, | Xu, Liu, Z., An, Z., Qiang Sun, Meng, J. (2024). Long-term biochar application promoted soil aggregate-associated **potassium availability and maize potassium uptake**. Wiley Online Library, 16(4), 13134. https://doi.org/10.1111/gcbb.13134

From the Abstract: “after 9 years of field application, biochar inhibited the downward K migration to the deeper layer, thus increasing water-soluble potassium (WSK), exchangeable potassium (EK), non-exchangeable potassium (NEK), and total potassium (TK) in 0–20 cm soil, with C1F exhibiting better performance than C2F and C3F. Biochar also increased aggregate-associated EK, NEK, and TK pools, mainly due to an increase in the macroaggregate proportion (>0.25 mm).”

Bekchanova, M, … L. C.-E., (2024) Biochar improves the nutrient cycle in sandy-textured soils and **increases crop yield:** a systematic review. Environmental evidence journal …. https://environmentalevidencejournal.biomedcentral.com/articles/10.1186/s13750-024-00326-5

From the Abstract: “According to the results, soil total and available nitrogen [N], phosphorous [P] and potassium [K], plant nutrient level, and potential cation exchange capacity (CEC) increased by 36% (CI [23%, 50%]), 34% (CI [15%, 57%]), 15% (CI [1%, 31%]), and 18% (CI [3%, 36%), respectively, and N_2O emission and mineral nutrient leaching decreased by 29% (CI [− 48%, − 3%]) and 38% (CI [− 56%, − 13%).”

Branch, J., Science, M. B.-M. J. of S., (2024) **Mitigating Nitrogen Leaching** in Mineral Soils using Pineapple Leaf Biochar. Msss.Com.My. https://www.msss.com.my/mjss/Full Text/vol28/V28_01.pdf

Chen, X., Zhao, T., Nie, X., Guo, X., Land, P. L.-, (2024) **Soil Substrate Characteristics** for Planting Hole Greening Technology for High, Steep, Rocky Slope Vegetation in Semi-Arid Areas. Mdpi.Com. https://www.mdpi.com/2073-445X/13/3/287

From the Abstract: "the water-retaining agent, biochar, and agglomerating agent had inconsequential effects on soil characteristics and plant growth. The optimal substrate composition included a 7:3 ratio of base soil to peat, 1.5 g/L of water retainer, 10 mg/L of agglomerating agent, 5 g/L of biochar, and 5 g/L of controlled-release compound fertilizer."

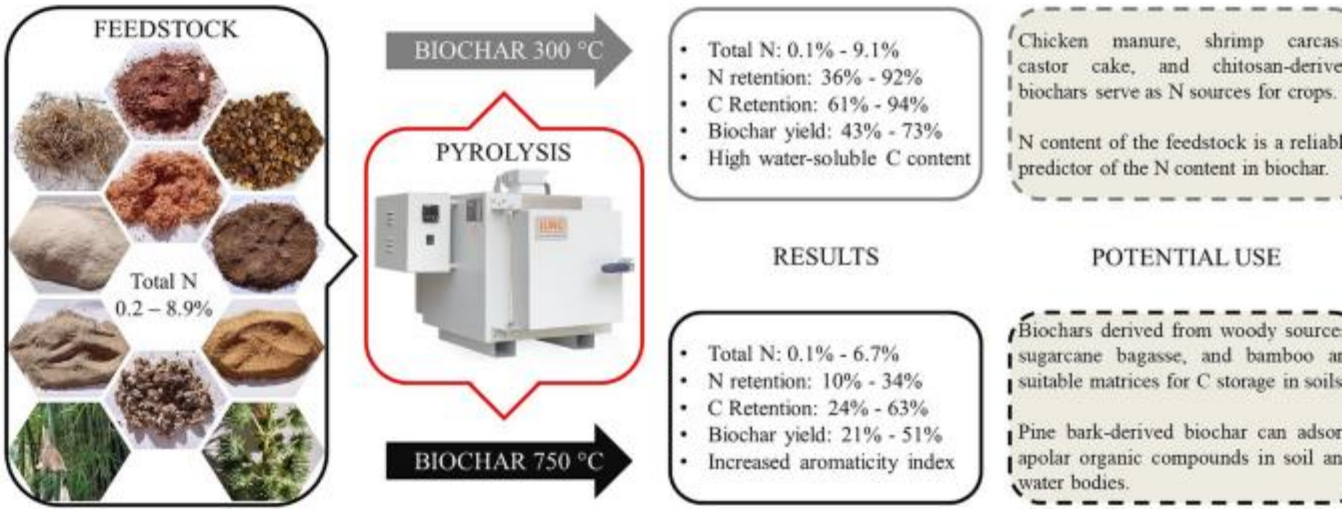
Hematimatin, N., Igaz, D., Aydın, E., & Horák, J. (2024). Biochar application regulating soil **inorganic nitrogen and organic carbon content** in cropland in the Central Europe: a seven-year field study. Biochar, 6(1), 14. https://doi.org/10.1007/S42773-024-00307-4

From the Abstract: "The study suggests that incorporating biochar treatments may enhance N-fertilizer effectiveness. However, the long-term implications of biochar application with N-fertilizer on N mineralization are specific to individual soil and biochar combinations. Except the application of 20 t ha^{-1} biochar at N2 in 2019, biochar did not affect the crop yields."

Pacheco, L., Machado, R., … F. S.-R., (2024) Effects of biochar on **soil fertility** and the morphometry and production of elephant grass cultivars. SciELO Brasil. https://www.scielo.br/j/rcaat/a/SZ9dgQLZBB435k6WD3PrwzF/

Paiva, I. de O., Morais, E. de, … K. J.-W. and B., (2024) **Biochar N Content, Pools and Aromaticity** as Affected by Feedstock and Pyrolysis Temperature. Springer. https://link.springer.com/article/10.1007/s12649-023-02415-x

From the Abstract: "As charring conditions intensified, available N forms, such as N-NH_4^+ and N-NO_3^-, were lost. Biochars obtained from pine bark, eucalyptus sawdust, sugarcane bagasse, and bamboo exhibited high C content, low N content, and C:N ratios exceeding 100:1. The losses of C and N were independent of each other, with N chemical species demonstrating higher volatility compared to C compounds."



Qodarrohman, M., Utami, S., … J. W.-J. of E., (2024) Biochar and Biofertilizer Reduce the Use of Mineral Fertilizers, Increasing the Efficiency of **Shallot Fertilization**. Jeeng.Net. http://www.jeeng.net/pdf-183942-106730?filename=Biochar and Biofertilizer.pdf

Raifer, B., Lucchetta, V., Loesch, M., … G. C.-L., (2024) The use of **biochar as a soil amendment did not affect wine quality** in a Müller Thurgau vineyard in South Tyrol (Italy). Journal.Laimburg.It. https://journal.laimburg.it/index.php/laimburg-journal/article/view/150/228

Shabir, R, Li, Y., Megharaj, M., (2024) Pyrolysis temperature affects biochar suitability as an **alternative rhizobial carrier**. Springer. https://link.springer.com/article/10.1007/s00374-024-01805-0

From the Abstract: "The results were compared to a control group (without inoculants) and a peat inoculant. Among all the materials derived from pine wood and oak, pine wood biochar pyrolyzed at 400°C

(P-BC400) exhibited the highest CFU count, with values of 10.34 and 9.74 Log 10 CFU g− 1 after 90 days of storage at 28℃ and 38℃, respectively."

Singh, P., Tomar, B., Patle, T., Tomar, S., & Gupta, S. (2024) Biochar a Modern Approach Towards **Sustainable Agriculture**. Researchgate.Net. https://www.researchgate.net/profile/Prashant-Singh-168/publication/378343088_Biochar_in_Sustainable_Agriculture/links/65d5cbf4adf2362b634a4cc7/Biochar-in-Sustainable-Agriculture.pdf

Wang, J., Zhai, B., Shi, D., Chen, A., Plants, C. L.-, (2024) How Does Bio-Organic Fertilizer Combined with Biochar Affect Chinese Small Cabbage's **Growth and Quality** on Newly Reclaimed Land? Mdpi.Com. https://www.mdpi.com/2223-7747/13/5/598

Yang, C., Dou, S., Guo, D., Agronomy, H. Z.-, (2024) The Application of Biochar Enhances **Soil Organic Carbon and Rice Yields.** Mdpi.Com. https://www.mdpi.com/2073-4395/14/3/455

From the Abstract: "Applying biochar at a rate of 20 t ha−1 is a sensible and effective approach to enhance the soil organic carbon (SOC) content, enhance the stability of the humic acid (HA)'s structure, and raise the rice yield in the rice-growing area of Northeast China."

Raya-Moreno, I., Cañizares, R., Domene, X., Agriculture, V. C.-, (2024) **Biochar Addition** to a Mediterranean Agroecosystem: Short-Term Divergent Priming Effects. Mdpi.Com. https://www.mdpi.com/2077-0472/14/2/242

From the Abstract: "Conducted in a vineyard with a sandy loam Mediterranean soil with neutral pH and low organic carbon content, the experiment involved the application of 6.5 g biochar kg−1 derived from pine (PB) and corn cob (ZB). The monitoring period spanned two years, with soil samples collected at short- and medium-term timepoints (2 and 26 months post-application) and incubated in the lab for an additional 250 days."

Yang, K., Hu, J., Ren, Y., Zhang, Z., Tang, M., Agronomy, Z. S.-, (2024) Enhancement of **Soil Organic Carbon, Water Use Efficiency and Maize Yield** (Zea mays L.) in Sandy Soil through Organic Amendment (Grass Peat) incorporation. Mdpi.Com. https://www.mdpi.com/2073-4395/14/2/353

From the Abstract: "the soil nutrients and labile organic carbon (DOC, MBC, KMnO4-C and POC) concentrations were higher under OM (GP, BC, OF and MS) treatments than in CK in the 0–0.10 m soil layers. GP treatment remarkably improved carbon pool index values (1.63, 2.51 and 2.24, respectively) in all layers compared to CK (1.00). At maturity stages of maize, the soil water content (SWC) under GP and OF treatments (11.3–13.4%) was remarkably higher than that in CK treatment (around 10.0%)."

Zhang, J., Wang, Y., Shi, Y., Yang, B., Zhang, A., Du, Z., … Wang, J. (2024). **Dosage- and site-dependent retention of black carbon and polycyclic aromatic hydrocarbons** in farmland soils via long-term biochar addition. Carbon Research, 3(1). https://doi.org/10.1007/S44246-023-00095-9

From the Abstract: "increasing cumulative biochar dosage caused elevated contents of black carbon and PAHs, accompanied by decreases in their retention efficiencies. Contrasting retention was observed between sites, with the Shandong site characterized by higher retention efficiencies of BPCAs and lower retention efficiencies of PAHs, possibly owing to its higher temperature, more sandy soil texture, less irrigation, and lower sunlight intensity"

Cheng, Z., Guo, J., Jin, W., Liu, Z., Wang, Q., … L. Z.-S. and T., (2024) Responses of **SOC, labile SOC fractions, and amino sugars** to different organic amendments in a coastal saline-alkali soil. Elsevier. https://www.sciencedirect.com/science/article/pii/S0167198724000527

From the Abstract: "The three amendments, including straw (C/N of 75.5:1), straw biochar (C/N of 43:1), and soybean cake (C/N of 7.4:1), were continuously added into the soil at an equal C amount of 2250 kg C ha−1 for four years. Compared to mineral fertilizer alone, the contents of SOC in plots receiving straw, straw biochar, and soybean cake were increased by 7.6%, 17.3%, and 12.7%, respectively.”

Raza, S., Irshad, A., Margenot, A., Zamanian, K., Geoderma, N. L.-, (2024) Inorganic carbon is overlooked in **global soil carbon research**: A bibliometric analysis. Elsevier. https://www.sciencedirect.com/science/article/pii/S0016706124000600

Jena, T., Dayal, P., Pradhan, S., Sow, S., & Ranjan, S. (2024) Role of Biochar in **Soil Carbon Dynamics**. Researchgate.Net. https://www.researchgate.net/profile/Smruti-Ranjan-Padhan/publication/378402275_Role_of_Biochar_in_Soil_Carbon_Dynamics/links/65d86626c3b52a1170ed1c2a/Role-of-Biochar-in-Soil-Carbon-Dynamics.pdf

Aziz, M. A., Khan, K. S., Khalid, R., Shabaan, M., Alghamdi, A. G., Alasmary, Z., & Majrashi, M. A. (2024). Integrated application of **biochar and chemical fertilizers** improves wheat (Triticum aestivum) productivity by enhancing soil microbial activities. Plant and Soil. https://doi.org/10.1007/S11104-024-06556-3

From the Abstract: “Efficient adsorption of CPX up to 113.97 mg/g (qms) was reported at pH 5. Pollutant removal was recorded in 12 hours of retention time due to induced π–π interactions, electrostatic and hydrophobic surface interactions highlighting chemosorption.”

Xu, M., Xiao, R., Mei, C., Chen, J., Huang, Q., Huang, F., & He, M. (2024). Rice husk biochar reduces **Cd availability** by affecting microbial community activity and structure in Cd-contaminated soils. Journal of Soils and Sediments. https://doi.org/10.1007/S11368-023-03711-8

From the Abstract: “Compared to CK, BC significantly facilitated the conversion of bioavailable Cd to residual Cd, especially in medium Cd-contaminated soil where the residual Cd content increased by

76.35%. Biochar also significantly enhanced pH, soil organic matter, cation exchange, available phosphorus, rapidly available potassium, and catalase activities, except for ammonium nitrogen content and sucrase activities."

Amutova, F., Turganova, R., … G. K.-J. of, (2024) The Effect of Granulometry of Carbonaceous Materials and Application Rates on the **Availability of Soil-Bound Dichlorodiphenyltrichloroethane (DDT)** and Its metabolites. Mdpi.Com. https://www.mdpi.com/2039-4713/14/1/16

From the Abstract: "The sequestration material demonstrated different efficiency values (up to 58 ± 4% for Sargasso BC < 150 µm and 85 ± 4% for DARCO at a 2% application rate). Finally, a clear molecule effect was displayed, demonstrating the following immobilization order: p,p'-DDE > p,p'-DDD > p,p'-DDT > o,p'-DDT."

Fedeli, R., Vannini, A., Djatouf, N., Celletti, S., Heliyon, S. L.-, (2024) Can lettuce plants grow in **saline soils** supplemented with biochar? Cell.Com. https://doi.org/10.1016/j.heliyon.2024.e26526

Fei, Y., She, D., Yi, J., Sun, X., Han, X., Liu, D., … Zhang, H. (2024). Roles of soil amendments in the water and salt transport of **coastal saline soils** through regulation of microstructure. Land Degradation & Development. https://doi.org/10.1002/LDR.5066

From the Abstract: "Compared with those of the blank control, soil internal mean water flow rate increased by 22.2% at B2 treatments and 69.2% at P2 treatments, respectively. However, their increases were less pronounced at B3 treatments and the water flow rate decreased by 50.5% at P3 treatments."

Gao, B., Zhang, J., Liu, J., Ayati, A., Pollution, M. S.-E., (2024) Excess sludge-based biochar loaded with manganese enhances catalytic **ozonation efficiency** for landfill leachate treatment. Elsevier. https://www.sciencedirect.com/science/article/pii/S0269749124003051

From the Abstract: "The concentration of NH+4-N was reduced from the initial 1087.03 ± 9.56 mg/L to 9.05 ± 1.91 mg/L, while COD was reduced from 2290 ± 14.14 mg/L to 86.5 ± 2.12 mg/L, with corresponding removal rates of 99.17% and 99.20%, respectively. This method offers high efficiency and stability, achieving discharge standards for leachate (GB16889-2008)."

Gonçalves, M. A. F., da Silva, B. R. S., Nobre, J. R. C., Batista, B. L., & da Silva Lobato, A. K. (2024). Biochar Mitigates the Harmful Effects of **Drought in Soybean** Through Changes in Leaf Development, Stomatal Regulation, and Gas Exchange. Journal of Soil Science and Plant Nutrition. https://doi.org/10.1007/S42729-024-01663-7

From the Abstract: "The use of BC induced significant increases in biomass, including leaf dry matter (327%), root dry matter (40%), and total dry matter (84%)."

Huang, H., Zhong, K., Tan, J., Nong, X., Chen, J., & Zhang, C. (2024). Changes in Microbial Community and Activity Caused by Application of Silkworm Excrement and Biochar Under **Atrazine Stress** in Soil. Soil and Sediment Contamination. https://doi.org/10.1080/15320383.2024.2317155

Kenea, S. A., … T. A. G.-… and E. S., (2024) Examining the Effect of **Combined Biochar and Lime Rates** on Selected Soil Physicochemical Properties of Acid Soils in Gimbi District, Western Ethiopia. Hindawi.Com. https://www.hindawi.com/journals/aess/2024/4440448/

From the Abstract: "The application of 10 ton of CHB + 75% of STV in Farms-1 and 2 resulted in the highest SOC of 7.44% and 7.68%, respectively. The application of 10 ton of CHB + 75% of STV in Farms-1 and 2 resulted in 4.86 mg·kg−1 and 6.96 mg·kg−1 available P, respectively."

Khatun, M., Hossain, M., Studies, J. J.-K. U., (2024) BIOCHAR AS A **POTENTIAL SOIL CONDITIONER** IN SALINE PRONE COASTAL AREA OF BANGLADESH. Kus.Ku.Ac.Bd. https://kus.ku.ac.bd/kustudies/article/view/1099

Ouyang, J., Tong, G., Liu, Z., Liu, M., Yu, K., … F. Z.-J. of, (2024) **Removal of quinclorac herbicide** in soil by FeS2@ BC coupling with persulfate process: Soil constituent and phytotoxicity. Elsevier.
https://www.sciencedirect.com/science/article/pii/S2213343724003889

From the Abstract: "FeS2@BC/PMS system successfully removed 90.77% of QNC from contaminated soil after 6 h of reaction at 2 g/L FeS2@BC, 4 mM PMS, and 30 mg/kg QNC-polluted soil."

Rong, H., He, L., Pollution, M. T.-E., (2024) **Transport and release behaviors of PFOA** in saturated and unsaturated porous media with biochar amendment. Elsevier.
https://www.sciencedirect.com/science/article/pii/S0269749124003300

From the Abstract: "The inhibited transport of PFOA by biochar also held true in solution with copresence of natural organic matter and in actual river water. Moreover, we found that negligible PFOA was released from porous media with biochar amendment even after exposure to freeze-thaw/dry-wet treatment."

Wu, W., Chai, H., Gao, P., Gao, P., Zhang, X., Li, M., … Lv, Q. (2024). Effects of brackish water irrigation and biochar application on fertility, enzyme activity, and winter wheat yield in **coastal saline-alkali soils**. Land Degradation & Development.
https://doi.org/10.1002/LDR.5071

From the Abstract: "Biochar application increased winter wheat yield, with the K_2Y_{10} treatment showing the highest yield under brackish water irrigation conditions, and increased by 17.7% compared to CK."

Antonious, G. F. (2024). Impact of biochar and organic fertilizers on **sweet potato yield, quality, ascorbic acid, β -carotene, sugars, and phenols contents**. International Journal of Environmental Health Research, 1–12.
https://doi.org/10.1080/09603123.2024.2318368

From the Abstract: "the concentrations of vitamin C (260. 3 μg g−1), β-carotene (45.4 μg g−1), soluble sugars (16.7 mg g−1), and total phenols (196.3 3 μg g−1 fresh roots) were greater in the roots of plants

grown in Cow compared to the roots of the control treatment. The results indicated the low impact of biochar whereas Cow is recommended for enhancing sweet potato yield and nutritional composition."

Aurangzeib, M., Zhang, S., Yan, S., Zhou, J., Niu, X., Yan, P., & Wang, J. (2023). Biochar Application Can Improve Most of the **Chemical Properties of Acidic Soils**: A Global Meta-Analysis. ACS Agricultural Science and Technology. https://doi.org/10.1021/ACSAGSCITECH.3C00564

From the Abstract: "The biochar application rates ≥ 80 t ha–1 significantly increased the acidic SpH, soil available nitrogen (SAN), soil available potassium (SAK), and SOM. The BpH ≥ 10 increased all the observed acidic soil properties except SEC. The BC/N 30–45 significantly increased SAN, SAP, and SOM, while the BC/N ≤ 30 was more effective at increasing SpH and SAK."

Erguler, D., Okyay, F. (2024). Effects of Farmyard Manure and Biochar Treatments on the Development and Water Use of Lettuce Under the **Deficit Irrigation Regime**. Agrifoodscience.Com, 12(2), 274–283. https://doi.org/10.24925/turjaf.v12i2.274-283.6662

From the Abstract: "the yield and yield characteristics in 75% irrigation treatment do not decrease at a very significant level compared to full irrigation (100%) and that these decreases can be compensated by biochar and that the farmyard manure+biochar as alternative treatment is also effective in improving the decrease in yield parameters, treatment of 10 ton ha-1 farmyard manure+10 ton ha-1 to the soil at 75% irrigation water level was found to be recommended in lettuce cultivation."

Huang, D., Chen, Y., Bai, X., Zhang, R., … Q. C.-J. of, (2024) **Methane removal** efficiencies of biochar-mediated landfill soil cover with reduced depth. Elsevier. https://www.sciencedirect.com/science/article/pii/S0301479724004730

From the Abstract: "In addition to the geotechnical reasons for gas transport processes, the evolution in methanotroph community structure (mainly type I methanotrophs) induced by biochar amendment and

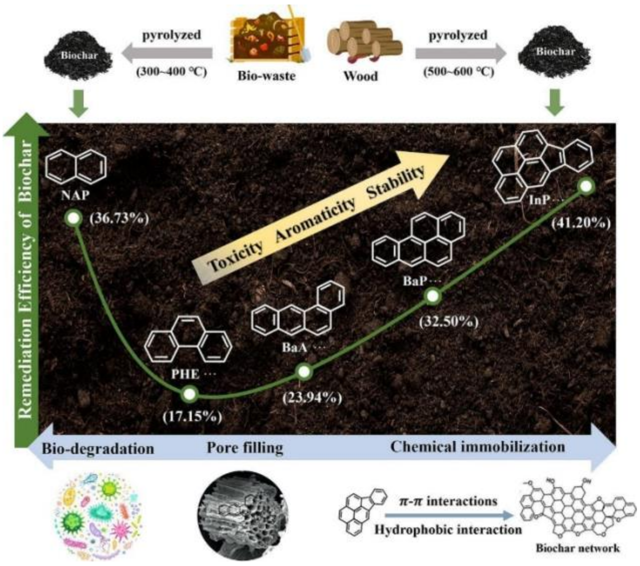
variations in soil properties supplemented the biological reasons for the varying methane removal efficiencies."

Kumar Ashok, N., Periyakaman, C., Ramiah, N., Pandian, K., Muthu, A., Srinivasan, C., Muthu, A. (2024). **Silicon accumulation** in leaves reduces the population of shoot and fruit borer, Earias vitella (Fab.)(Lepidoptera: Noctuidae) and enhances the yield of bhendi. https://doi.org/10.21203/rs.3.rs-3956916/v1

From the Abstract: "seed treatment with biochar @ 100 g/kg of seeds + basal application of biochar @ 75 kg/ha + foliar spray of 1% potassium silicate on 30 and 60 days after sowing (DAS) and 1% azadirachtin on 45 and 75 DAS (T9), showed a significant reduction in the population of bhendi shoot and fruit borer. This might be due to the high amount of silicon content compared to the other treatments. It was followed by seed treatment with biochar @ 100 g/kg of seeds + basal application of RHA @ 75 kg/ha + foliar spray of 1% potassium silicate applied on 30 and 60 DAS and 1% azadirachtin applied on 45 and 75 DAS (T10). The per cent reduction over untreated check observed was 52.28% in the treatment (T9), whereas it was 47.07% in the T10."

Li, Q., Chen, R., Xu, Y., Chen, C., Xiong, J., … W. T.-S. of T. T., (2024) Examining diverse remediation mechanisms of biochar in **soil contaminated with polycyclic aromatic hydrocarbon (PAH)** of various ring structures: A global meta. Elsevier. https://www.sciencedirect.com/science/article/pii/S0048969724013172

From the Abstract: "The reduction of PAH contents in the contaminated soil first decreased from 37.61 % to 17.44 % and then increased to 40.29 % with an increase in the number of aromatic rings from 2 to 6. Our study results suggest that biochar prepared from bio-waste at low temperatures could be favorable for reducing the content of NAP in soil. Wood-derived biochar pyrolyzed at a relatively high temperature is recommended for remediation of soil contaminated with PAHs with 5 or 6 aromatic rings."



Lin, Z., Wu, W., Yang, C., Yang, G., Wu, W., Wei, T., (2024) Mechanisms of biochar assisted **di-2-ethylhexyl phthalate (DEHP) biodegradation** in tomato rhizosphere by metabolic and metagenomic analysis. Elsevier. https://www.sciencedirect.com/science/article/pii/S0045653524004132

From the Abstract: "a significant increase of rhizosphere pH, organic matter and humus by biochar amendment, which achieved a satisfactorily higher DEHP removal efficiency, maximally 77.53% in treatments with 1.0% of biochar. Biochar addition also remarkably changed rhizosphere bacterial communities by enriching some potential DEHP degraders of Nocardioides, Sphingomonas, Bradyrhizobium and Rhodanobacter."

Manahiloh, K., Kaliakin, V., & 2024, K. V.-G.-C. (2024) Evaluation of **Biochar as a Soil Improvement** Additive to Mid-Atlantic Expansive Clay. Ascelibrary.Org. https://ascelibrary.org/doi/abs/10.1061/9780784485330.045

From the Abstract: "The optimum moisture content remained unchanged when the volume of biochar rose from 6% to 10%. Unconfined compression tests showed that the shear strength of the fat clay increased at least twofold as the percentage of biochar was increased. Compression tests showed that the compressibility of fat clay decreased as the biochar percentage increased."

Pinna, M. V., Diquattro, S., Garau, M., Grottola, C. M., Giudicianni, P., Roggero, P. P., … Garau, G. (2024). Combining biochar and grass-legume mixture to improve the **phytoremediation of soils contaminated with potentially toxic elements (PTEs)**. Cell.Com, 10, e26478. https://doi.org/10.1016/j.heliyon.2024.e26478

> **From the Abstract:** "shoot and root biomass of the C + B intercropped hairy vetch and annual ryegrass increased 9- and 7-fold, and ~3-fold respectively, compared to the respective C plants. The biochar addition decreased PTE-uptake by both plants, while mixed cropping increased the uptake of PTEs by shoots of hairy vetch grown in C and C + B."

Zhao, R., Wang, T., Wang, Z., Cheng, W., … L. L.-J. of H., (2024) Activation of peroxymonosulfate with natural pyrite-biochar composite for **sulfamethoxazole degradation** in soil: organic matter effects and free radical conversion. Elsevier. https://www.sciencedirect.com/science/article/pii/S0304389424004746

> **From the Abstract:** "a natural pyrite-biochar composite material (FBCx) was developed, demonstrating superior activation performance and achieving a 76% removal rate of SMX from soil within 120 min. There existed different degradation mechanisms for SMX in aqueous and soil solutions, respectively. The production of $^1O_2$ and inherent active species produced by soil slurry played an important role in the degradation process."

🔓 Alizadeh, M., Gerami, M., Majidian, P., Heliyon, H. G.-, (2024) The potential application of biochar and salicylic acid to **alleviate salt stress** in soybean (Glycine max L.). Cell.Com, 10, e26677. https://doi.org/10.1016/j.heliyon.2024.e26677

> **From the Abstract:** "the resultant data showed that the combination treatment of 5 and 10 WP of biochar and 1 mM of salicylic acid caused increase of the aforementioned parameters in order to improve their performance subjected to higher concentration of salinity."

Ashkanani, Z., Mohtar, R., Al-Enezi, S., … P. S.-J. of H., (2024) AI-assisted systematic review on **remediation of contaminated soils with PAHs and heavy metals**. Elsevier. https://www.sciencedirect.com/science/article/pii/S0304389424003923

Igwegbe, C., Kozłowski, M., Wąsowicz, J., Materials, E. P.-, (2024) **Nitrogen Removal** from Landfill Leachate Using Biochar Derived from Wheat Straw. Mdpi.Com. https://www.mdpi.com/1996-1944/17/4/928

From the Abstract: "BC was more efficient (95.08%) than commercial activated carbon AC (93.11%), the blank, in adsorbing nitrogen from NH4Cl. This superior performance of BC may be attributed to its higher carbon content (57.74%) observed through elemental analysis. Lower results for BC/LLCH may be due to LLCH's complex chemical matrix. The Langmuir isotherm model best described BC/NH4Cl adsorption (qm = 0.5738 mg/g)."

Kamedulski, P., Chu, J., Wang, S., Yu, J., Gao, Y., Tang, Z., & Yang, Q. (2024). Effects of Pyrolysis Temperature and Acid-Base Pre-Treatment on the Synthesis of Biochar-Based **Slow-Release Selenium Fertilizer** and Its Release in Soil. Mdpi.Com. https://www.mdpi.com/1996-1944/17/4/879

From the Abstract: "Alkali-W800-Se had a higher proportion of Se-exchangeable release, accounting for 87.5% of the total loaded selenium, while Acid-W300-Se had the lowest proportion at 62.2%. However, the Se releases of Alkali-W800-Se were more than 42.49% and 37.67% of the total Se-loading capacity during 5 days of continuous red soil extraction and brown soil extraction, respectively. Acid-W300-Se released less than 20% of the total Se-loading capacity."

Danish, S., Hasnain, Z., Dawar, K., Fahad, S., Shah, A. N., Salmen, S. H., & Ansari, M. J. (2024). Enhancing maize **resilience to drought stress**: the synergistic impact of deashed biochar and carboxymethyl cellulose amendment. BMC Plant Biology, 24(1). https://doi.org/10.1186/S12870-024-04843-W

From the Abstract: "1 DAB + 25 CMC caused significant enhancement in maize shoot fresh weight (24.53%), shoot dry weight (38.47%), shoot length (32.23%), root fresh weight (19.03%), root dry weight (87.50%) and root length (69.80%) over control under drought stress. A substantial increase in maize chlorophyll a (40.26%), chlorophyll b (26.92%), total chlorophyll (30.56%), photosynthetic rate (21.35%), transpiration rate (32.61%), and stomatal conductance (91.57%) under drought stress showed the efficiency of 1 DAB + 25 CMC treatment compared to the control."

Irin, I., Stresses, M. H.-, (2024) Organic Amendments: Enhancing **Plant Tolerance to Salinity and Metal Stress** for Improved Agricultural Productivity. Mdpi.Com. https://www.mdpi.com/2673-7140/4/1/11

Qian, L., Huang, S., Song, Z., Fahad, S., Dawar, K., Danish, S., … Salmen, S. H. (2024). Effect of carboxymethyl cellulose and gibberellic acid-enriched biochar on **osmotic stress tolerance in cotton**. BMC Plant Biology, 24(1). https://doi.org/10.1186/S12870-024-04792-4

From the Abstract: "0.8 GA_3-BC led to increase in cotton shoot fresh weight (99.95%), shoot dry weight (95.70%), root fresh weight (73.13%), and root dry weight (95.74%) compared to the control group under osmotic stress. There was a significant enhancement in cotton chlorophyll a (23.77%), chlorophyll b (70.44%), and total chlorophyll (35.44%), the photosynthetic rate (90.77%), transpiration rate (174.44%), and internal CO_2 concentration (57.99%) compared to the control group under the 40 OS stress."

Sørmo, E., Lade, C., … J. Z.-S. of T. T., (2024) Stabilization of **PFAS-contaminated soil** with sewage sludge-and wood-based biochar sorbents. Elsevier. https://www.sciencedirect.com/science/article/pii/S0048969724011100

From the Abstract: "Up-flow column percolation tests (15 days and 16 pore volume replacements) with 1 % biochar indicated that the dominant congener in the soil, perfluorooctane sulphonic acid (PFOS) was retained best by the aWT biochar with a 99.9 % reduction in the leachate concentration, followed by sludge-based DWSS (98.9 %) and DSS-2 and DSS-1 (97.8 % and 91.6 %, respectively)."

🔓Wang, S., Song, L., He, H., Coatings, W. Z.-, (2024) Volatile Organic Compounds (VOCs) in Soil: Transport Mechanisms, Monitoring, and **Removal by Biochar-Modified Capping Layer**. Mdpi.Com. https://www.mdpi.com/2079-6412/14/3/270

Food, Y. G.-N., (2024) Biochar and rice **cadmium**. Nature.Com. https://www.nature.com/articles/s43016-024-00934-x

Huang, S., Xin, L., Meng, Z., Ge, H., & Lin, Z. (2024). Effects of soil water content on **Cd immobilization** and uptake by leek with the combined application of biochar and organic fertilizer. Environmental Science and Pollution Research. https://doi.org/10.1007/S11356-024-32294-1

> **From the Abstract:** "the percentages of F1 under the treatments of CK, BC, and BO were 64.43%, 49.13%, and 43.67% at 75% field water capacity treatment, respectively. For the same treatment, with increasing water contents, the better the Cd was immobilized in the soil and the greater the leek biomass."

Li, C., Xing, J., Xu, Q., Cui, D., Liu, Y., Pang, C., (2024) Biochar and microorganism assisted phytoremediation of severely **molybdenum-contaminated soil**: Efficacy, mechanisms and the impact of low temperatures. Elsevier. https://www.sciencedirect.com/science/article/pii/S0959652624006668

> **From the Abstract:** "Compared with the control, the removal rates of Mo from the soil increased from 7.63% to 24.78% and 25.59% under the treatments of ryegrass/R.ornithinolytica A1/biochar (T5) and ryegrass/S.marcescens A2/biochar (T6), respectively. Simultaneously, residual Mo (RES-Mo) proportions increased by 30.12% and 31.24%, respectively."

Wang, Z., Tang, W., Ding, X., Dong, Q., Guo, Y., … G. L.-J. of, (2024) Different **extractable pools of Cd and Pb in agricultural soil** under amendments: Water-soluble concentration

sensitively indicates metal availability. Elsevier.

https://www.sciencedirect.com/science/article/pii/S1001074224000615

From the Abstract: "extractable pools by BCR and $Ca(NO_3)_2$ extraction were little impacted by amendments and showed little correlation with soil pH. This is notable because soil pH is closely linked to metal availability, indicating these extraction methods may not adequately reflect metal availability. Conversely, water-soluble concentrations of Cd and Pb were markedly influenced by amendments and exhibited strong correlations with pH (Pearson's r: -0.908 to -0.825, $P < 0.001$), suggesting water extraction as a more sensitive approach."

Younis, U., Danish, S., Datta, R., Alahmadi, T. A., & Ansari, M. J. (2024). Sustainable **remediation of chromium-contaminated soils**: boosting radish growth with deashed biochar and strigolactone. BMC Plant Biology, 24(1). https://doi.org/10.1186/S12870-024-04791-5

From the Abstract: "20µM Strigolactone + DAB produced significant improvement in radish shoot length (27.29%), root length (45.60%), plant fresh weight (33.25%), and plant dry weight (78.91%), compared to the control under Cr stress. Significant enrichment in radish chlorophyll a (20.41%), chlorophyll b (58.53%), and total chlorophyll (31.54%) over the control under Cr stress, prove the efficacy of 20µM Strigolactone + DAB treatment."

Yuan, Z., Peng, A., Chu, Z., Zhang, X., Huang, H., … Y. M.-S. of T. T., (2024) Sustainable remediation of **Cr (VI)-contaminated soil** by soil washing and subsequent recovery of washing agents using biochar supported nanoscale zero-valent iron. Elsevier.

https://www.sciencedirect.com/science/article/pii/S0048969724012464

From the Abstract: "The contributions to Cr(VI) reduction by Fe0, surface-bound Fe(II), and soluble Fe(II) were 0.6 %, 39.8 %, and 59.6 %, respectively. Meanwhile, CA favoured the activity of surface-bound Fe(II) and Fe0 in nZVI-BC, enhancing the production of soluble Fe(II) to strengthen Cr(VI) removal."

Zeng, G., Si, M., Dong, C., Liao, Q., He, F., Johnson, V. E., … Yang, Z. (2024). Adsorption behavior of **lead, cadmium, and arsenic** on manganese-modified biochar: competition and promotion. Environmental Geochemistry and Health, 46(3). https://doi.org/10.1007/S10653-024-01865-Z

From the Abstract: "the binary metal system revealed a competitive adsorption between Pb and Cd, resulting in decreased Pb (from 214.38 mg/g to 148.20 mg/g) and Cd (from 165.73 mg/g to 92.11 mg/g). A notable promotion occurred between As and Cd, showing an increase from 234.93 mg/g to 305.00 mg/g for As and 165.73 mg/g to 313.94 mg/g for Cd."

Zhang, D., Lin, J., Luo, J., Sun, S., Zhang, X., … R. M.-S. of T. T., (2024) Rapid immobilization of **arsenic in contaminated soils** by microwave irradiation combined with magnetic biochar: Microwave-induced electron transfer for oxidation and immobilization of arsenic (III). Elsevier. https://www.sciencedirect.com/science/article/pii/S0048969724010556

From the Abstract: "After adding Fe-BC (10 wt%) and treating with microwave irradiation for 3 h, the content of As(III) in the soil was reduced to 54.56 %. Compared with the conventional heating treatment, the percentage of stabilized As (residual form) increased by 11.21 %."

Ahmad, J., Al-Farraj, A. S., Ahmad, M., Al-Swadi, H. A., & Al-Wabel, M. I. (2024). Functionalized organo-mineral composites of biochar for the effectual immobilization of **arsenic in contaminated soil**. Journal of Soils and Sediments. https://doi.org/10.1007/S11368-024-03730-Z

From the Abstract: "The similar treatment resulted in the highest phosphorus (3455 mg kg−1) and potassium (755 mg kg−1) in shoots. Phytoextraction indices showed that B6 composites with nano-bentonite can be used for the phytostabilization of As using maize plants."

Fang, Y., Wang, P., Zhang, L., Zhang, H., … R. X.-C. E., (2024) A novel Zr-P-modified nanomagnetic herbal biochar **immobilized Cd and Pb in water and soil** and enhanced the relative abundance of metal-resistant bacteria: Biogeochemical and spectroscopic investigations to identify the governing factors and potential mechanisms. Elsevier. https://www.sciencedirect.com/science/article/pii/S1385894724014645

From the Abstract: "Addition of ZMBC to the contaminated soil altered the mobile fraction of Cd2+ and Pb2+ to the residual fractions and thus significantly reduced the DTPA-extractable Pb2+ by 51.3% and Cd2+ by 56.1%, and also reduced the Cd and Pb in the wheat roots (by 64.0% and 36.1%, respectively) and shoots (by 73.5% and 62.2%, respectively), as compared to the untreated soil. The analysis of the soil 16S rDNA gene showed that the addition of ZMBC increased soil bacteria suitable for bioremediation of Pb2+ and Cd2+ contaminated soil."

Jia, Q., Sun, J., Gan, Q., Shi, N., Spectrum, S. F.-M., (2024). Zea mays cultivation, biochar, and arbuscular mycorrhizal fungal inoculation influenced **lead immobilization**. Am Soc Microbiol. https://doi.org/10.1128/spectrum.03427-23

From the Abstract: "biochar addition resulted in a significant, 42.00%, reduction in AMF colonization. Plant cultivation, AMF inoculation, and biochar addition all contributed to enhanced Pb immobilization, as evidenced by decreased levels of diethylenetriaminepentaacetic acid- and CaCl2-extractable Pb in the soil."

Kim, H. S., Lee, Y. K., Park, B. J., Lee, J. E., Jeong, S. S., Kim, K. R., … Yoon, J. H. (2024). Alginate-encapsulated biochar as an effective soil ameliorant for **reducing Pb phytoavailability** to lettuce (Lactuca sativa L.). Environmental Science and Pollution Research. https://doi.org/10.1007/S11356-024-32594-6

From the Abstract: "Adsorption of Pb onto BB followed multiple first-order kinetics and comprised fast and slow steps. More than 60% of the Pb was adsorbed in the fast step, i.e., within 3 h. Also, the BB treatment, up to the 5% level (w/w), increased soil pH from 5.4 to 6.5 and lowered the phytoavailable fraction of Pb in soil from 5.7 to 0.3 mg kg−1. The Pb concentrations in lettuce cultivated at 5% for the BP and BB treatments were similar but 63 and 66% lower, respectively, than those of the control soil."

Mridha, D, Sarkar, J., Majumdar, A., … K. S.-… S. and P., (2024) Evaluation of iron-modified biochar on **arsenic accumulation by rice**: a pathway to assess human health risk from cooked rice. Springer. https://link.springer.com/article/10.1007/s11356-024-32644-z

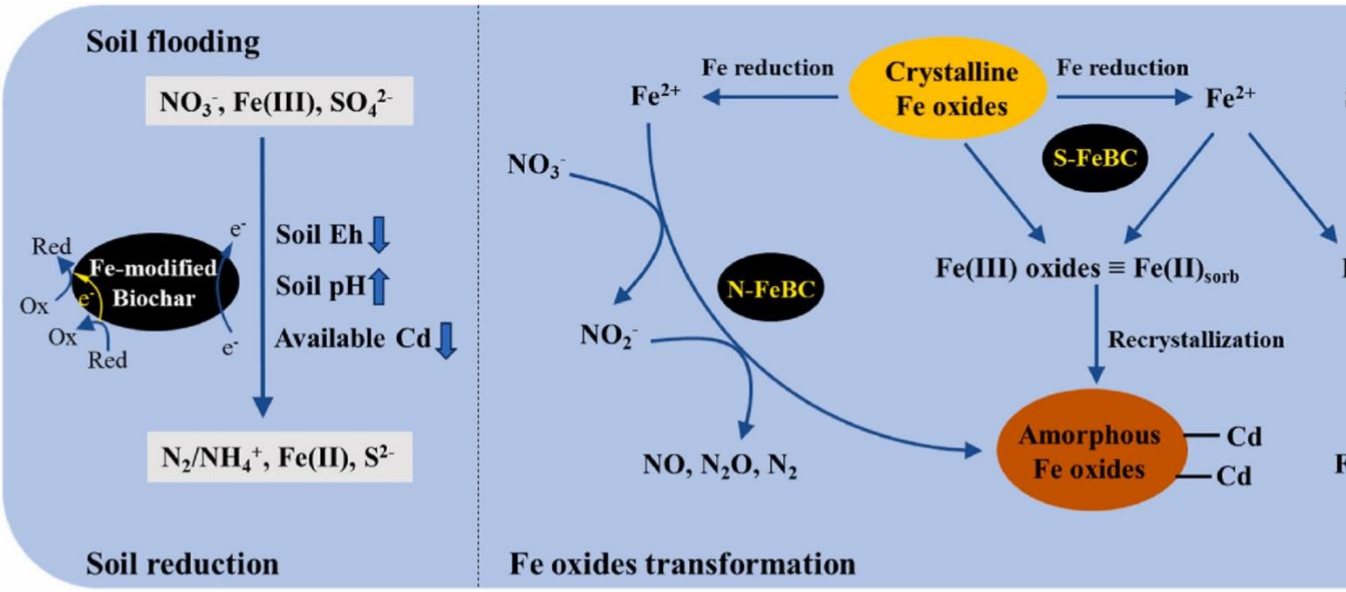
From the Abstract: "1% FeMBC enhanced the percentage of filled grains/panicle and biomass yield by 17 and 27%, respectively, compared to the control. The application of 0.5 and 1% FeMBC significantly ($p < 0.05$) reduced bioavailable soil As concentration by 33 and 48%, respectively, in comparison to the control."

Naeem, M. A., Shabbir, A., Imran, M., Ahmad, S., Shahid, M., Murtaza, B., … Khan, W. U. D. (2024). Silicon-nanoparticles loaded biochar for **soil arsenic immobilization** and alleviation of phytotoxicity in barley: Implications for human health risk. Environmental Science and Pollution Research. https://doi.org/10.1007/S11356-024-32580-Y

From the Abstract: "the addition of nano-Si-BC led to a 71% reduction in shoot As concentration compared to the control with 20 mg kg−1 of As, while BC alone resulted in a 51% decline. Furthermore, the 2% nano-Si-BC increased grain yield by 94% compared to control and 28% compared to BC. The addition of 2% nano-Si-BC to As-contaminated soil reduced oxidative stress (34% H_2O_2 and 48% MDA content) and enhanced plant As tolerance (92% peroxidase and 46% Ascorbate peroxidase activity)."

Si, T., Yuan, R., Qi, Y., Zhang, Y., Wang, Y., Bian, R., (2024) Enhancing soil redox dynamics: Comparative effects of Fe-modified biochar (N–Fe and S–Fe) on Fe oxide **transformation and Cd immobilization**. Elsevier. https://www.sciencedirect.com/science/article/pii/S0269749124003506

From the Abstract: "both N–FeBC and S–FeBC promoted Cd transfer from acid-soluble to Fe/Mn oxides bound fraction (Fe/Mn–Cd). N–FeBC significantly increased the concentration of amorphous Fe oxides (amFeox) from 4.0 g kg−1 in day 1 to 4.6 g kg−1 in day 15 by promoting the NO3−-reducing Fe(II) oxidation process, while S–FeBC significantly increased amFeox from 4.0 g kg−1 in day 15 to 4.8 g kg−1 in day 40 by promoting the Fe(II) recrystallization."



Song, P., Song, F., Liu, J., Ma, W., Chemical, X. G.-J. of E., (2024) Remediation of **cadmium-contaminated soil** by biochar-loaded nano-zero-valent iron and its microbial community responses. Elsevier.

https://www.sciencedirect.com/science/article/pii/S221334372400441X

From the Abstract: "5% nZVI@BC(1:3) performed the best. Soil available iron, pH, and CEC were significantly enhanced with increasing nZVI loading. The immobilization mechanism was analyzed, including ion exchange, physical adsorption, surface complexation, electrostatic attraction as well as co-precipitation."

Susianti, B., … I. W.-A. C., (2024) Comprehensive application to grow Calliandra calothyrsus by using cow dung biochar and solid waste from silica **sand purification on critical mining land**. Pubs.Aip.Org.

https://pubs.aip.org/aip/acp/article/3001/1/030035/3266173

From the Abstract: "Microbial biomass was also identified to observe biochar can improve chemical composition when mixed with solid waste. Where, 15.82% carbon, 46.67 nitrogen, and 60.82% phosphorus were identified in biochar and solid waste as fertilizer media."

Wang, S., He, X., Tian, J., Wu, R., Liu, H., … Z. F.-S. of T. T., (2024) NRT1. 2 overexpression enhances the synergistic interplay between ABA-generating bacteria and biochars in **reducing heavy metal accumulation** in pak choi. Elsevier. https://www.sciencedirect.com/science/article/pii/S0048969724014153

From the Abstract: "the aboveground HM content decreased by 1–49 %, 22–52 %, and 15–96 %, whereas the fresh weight increased by 12–38 %, 88–126 %, and 152–340 %, respectively, showing a significant correlation with NRT1.2 expression."

Wei, B., Zhang, D., Jeyakumar, P., Trakal, L., … H. W.-J. of H., (2024) Iron-modified biochar effectively mitigates **arsenic-cadmium pollution** in paddy fields: A meta-analysis. Elsevier. https://www.sciencedirect.com/science/article/pii/S030438942400445X

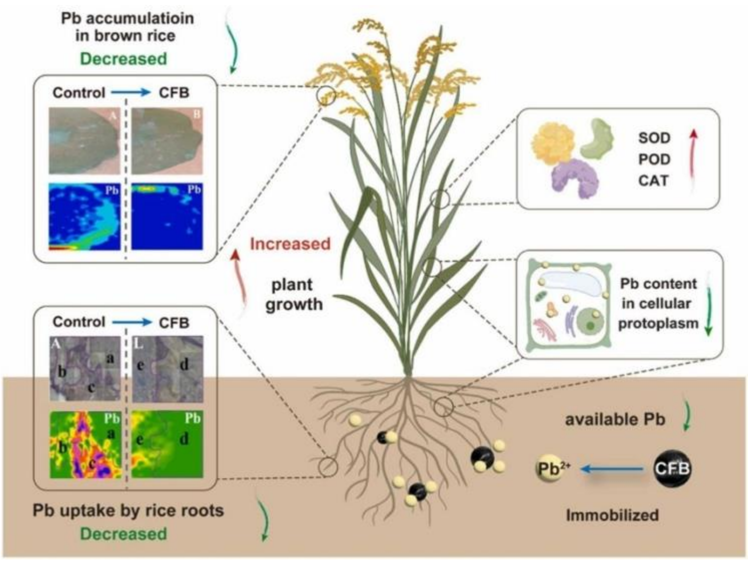
From the Abstract: "biochar significantly decreased the exchangeable and acid-soluble fraction of As (AsF1, 20.9%) and Cd (CdF1, 24.0%) in paddy fields; 2) iron-modified biochar significantly decreased AsF1 (32.0%) and CdF1 (27.4%); 3) iron-modified biochar in paddy fields contributed to the morphological changes in As and Cd, mainly characterized by a decrease in AsF1 (36.5%) and CdF1 (36.3%) and an increase in the reducible fraction of As (19.7%) and Cd (39.2%); and 4) iron-modified biochar in paddy fields increased As (43.1%) and Cd (53.7%) concentrations in the iron plaque on root surfaces."

Wongkiew, S., Aksorn, S., Management, S. A.-W., (2024) Bioponic systems with biochar: Insights into **nutrient recovery, heavy metal reduction, and microbial interactions** in digestate-based bioponics. Elsevier. https://www.sciencedirect.com/science/article/pii/S0956053X24001120

From the Abstract: "The overarching goal of this study was to investigate the application of biochar in digestate-based bioponics, focusing on its efficacy in nutrient recovery and heavy metal removal, while also exploring the microbial community dynamics. In this study, biochar was applied at 50 % w/w with 500 g dry weight of digestate during two 28-day crop cycles (uncontrolled pH and pH 5.5) using white stem pak choi (Brassica rapa var. chinensis) as a model crop."

Zhang, J., Li, J., Lin, Q., Huang, Y., Chen, D., … H. M.-J. of H., (2024) Impact of coconut-fiber biochar on lead translocation, accumulation, and detoxification mechanisms in a soil–rice system under **elevated lead stress**. Elsevier. https://www.sciencedirect.com/science/article/pii/S0304389424004825

From the Abstract: "



Shang, X., Wu, S., Liu, Y., Zhang, K., Guo, M., … Y. Z.-J. of H., (2024) Rice husk and its derived biochar assist phytoremediation of **heavy metals and PAHs co-contaminated soils** but differently affect bacterial community. Elsevier. https://www.sciencedirect.com/science/article/pii/S0304389424002632

From the Abstract: "The abundance of PAH-degraders, which increased with the culture time, was positively correlated with PAHs removal. Rice husk biochar decreased the richness and diversity of bacterial community, enhanced the growth of Steroidobacter, Bacillus, and Sphingomonas in rhizosphere soils. However, Steroidobacter, Dongia and Acidibacter were stimulated in rice husk amended soils."

Wang, J., Yongsheng, Y., Nepovimova, E., Hu, Y., Yang, Y., Li, S., … Kuca, K. (2024). Revolutionizing **soil heavy metal remediation**: Cutting-edge innovations in plant disposal technology. Elsevier, 918, 170577. https://doi.org/10.1016/j.scitotenv.2024.170577

Zhang, Y., Huang, G., Zhang, F., Fan, Z., … L. L.-C. E., (2024) Exploring the role of biochar and Fe2O3 in mitigating **copper and zinc bioavailability** in co-composting of pig manure and wine grape pomace. Elsevier. https://www.sciencedirect.com/science/article/pii/S1385894724009604

From the Abstract: "The findings revealed that Fe_2O_3 and biochar achieved Cu and Zn passivation rates of 39.8% and 14.7%, and 52.0% and 20.4% respectively. However, combining biochar and Fe_2O_3 resulted in lower passivation rates of 31.1% for Cu and 17.6% for Zn, attributed to 36% to 39% inhibition of heavy metal-resistant core colonies, *Pseudoxanthomonas* and *Chelatococcus*."

Chen, Q., Wang, L., Li, B., He, S., Li, Y., He, Y., (2024) Remediation of **Cadmium and Lead** in Mine Soil by Ameliorants and Its Impact on Maize (Zea mays L.) Cultivation. Mdpi.Com. https://www.mdpi.com/2073-4395/14/2/372

From the Abstract: "Biochar increased potassium and phosphorus in the soil and maize, while sepiolite significantly boosted overground phosphorus by 73.2%. Both ameliorants transformed Cd and Pb into a more stable state in the soil, reducing their accumulation in maize, especially with biochar, which effectively inhibited metal migration during leaching events."

Feng, J, He, J., Song, L., Liu, H., Liao, C., Biological, C. M.-C. and, (2024) Mechanism of composite passivators to reduce cadmium absorption and accumulation in Chinese cabbage on **cadmium-polluted soil**. Springer. https://link.springer.com/article/10.1186/s40538-024-00545-5

🔓 Li, X., Li, R., Zhan, M., Hou, Q., Zhang, H., Wu, G., (2024) Combined magnetic biochar and ryegrass enhanced the remediation effect of **soils contaminated with multiple heavy metals**. Elsevier. https://www.sciencedirect.com/science/article/pii/S0160412024000849

> **From the Abstract:** "magnetic biochar and ryegrass together decreased the concentrations of Cr, Ni, Cu, Zn, As, and Cd in soils by 24.12 %, 23.30 %, 22.01 %, 9.98 %, 14.83 %, and 15.08 %, respectively, and reduced the available fractions. Ryegrass roots were the main accumulation part of heavy metals, and the order of enrichment effect was ranked as Zn > As > Cr > Cu > Ni > Cd."

🔓 Yulia, E., Sunendar Purwasasmita, B., Ekawati, E., & Budi Nugraha, A. (2024). Fabrication of Adsorbent using Nano-Sized Lignocellulosic Biochar Coated on Luffa aegyptiaca Sponge to **Remove Heavy Metal Chromium VI**. Ukm.My, 53(1), 189–200. https://doi.org/10.17576/jsm-2024-5301-15

> **From the Abstract:** "The results of the adsorption process showed a decrease in Cr (VI) concentration, with adsorption efficiency reaching 94% for 1200 min and adsorption capacity of 0.36 mg/g. SEM-EDX results validated the attachment of Cr (VI) heavy metal ions to the adsorbent surface."

🔓 Fang, X., Lee, X., Twagirayezu, G., Cheng, H., Fungi, H. L.-J. of, (2024) A Critical Review of the Effectiveness of Biochar Coupled with Arbuscular Mycorrhizal Fungi in **Soil Cadmium Immobilization**. Mdpi.Com. https://www.mdpi.com/2309-608X/10/3/182

> **From the Abstract:** "The influences of biochar–AMF interactions on plant growth, nutrient uptake, and overall ecosystem health in cadmium-contaminated environments are highlighted. This review indicates that combining biochar and AMF can improve cadmium immobilization."

🔓 Gu, Z., Hui, X., Zeng, H., Qu, Q., Deji, Q., & … P. X.-P. J. of. (2024) Research Progress on the Application of Biochar in the **Remediation of Heavy Metals** in Tailings Soil.

Pjoes.Com. https://www.pjoes.com/pdf-176043-106678?filename=Research Progress on the.pdf

Malone, M., Sustainability, K. S.-, (2024) **Trace Metal Contamination** in Community Garden Soils across the United States. Mdpi.Com. https://www.mdpi.com/2071-1050/16/5/1831

Wyszkowska, J., Boros-Lajszner, E., Energies, J. K.-, (2024) The Impact of **Soil Contamination with Lead** on the Biomass of Maize Intended for Energy Purposes, and the Biochemical and Physicochemical Properties of the soil. Mdpi.Com. https://www.mdpi.com/1996-1073/17/5/1156

> **From the Abstract:** “It was accomplished in a pot experiment by testing the effects of 800 mg Pb2+ kg−1 d.m. soil and biocompost and biochar applied of 20 g kg−1 d.m. soil.”

Wang, X., Wang, T., Huang, Y., Liu, A., Li, Q., … Y. W.-E. and, (2024) Effect of biochars on the **immobilization and form of Cadmium (Cd)** in simulated Cd deposition of iron rich soils. Elsevier. https://www.sciencedirect.com/science/article/pii/S0147651324001209

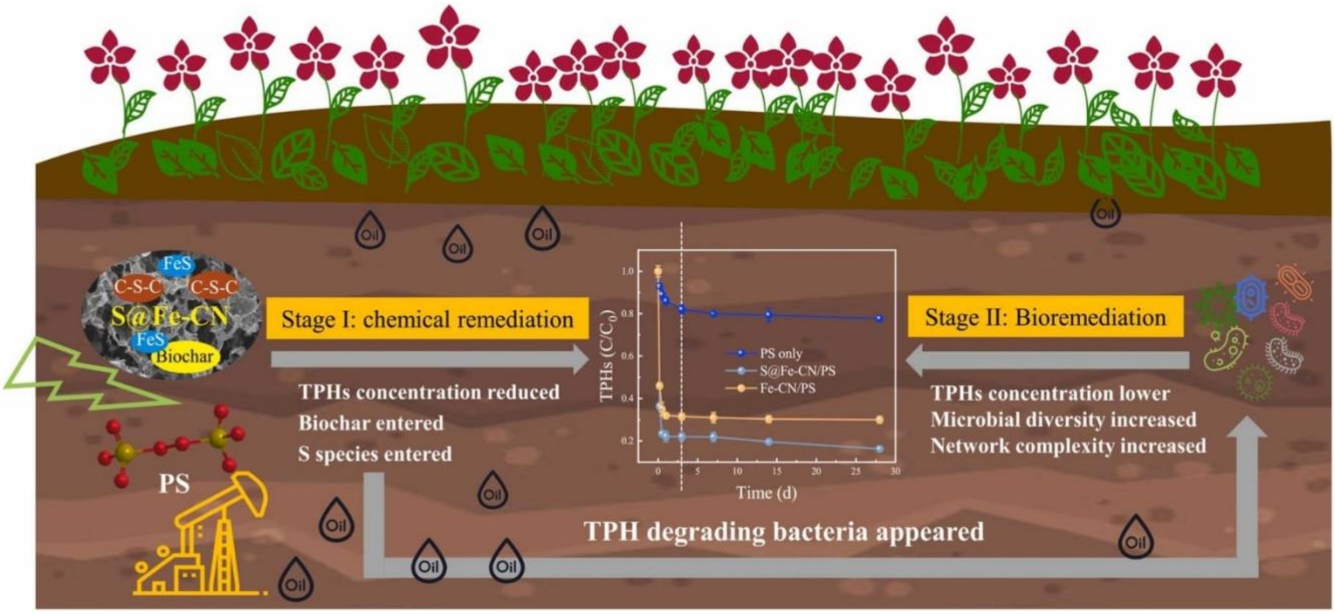
> **From the Abstract:** “the soil with biochar in our study could quickly fix “the new deposited Cd” in the soil in 3 h with the maximum adsorption capacity in rubber wood biochar-treated sample (3227.34 mg/kg）. The addition of all three biochar treatments significantly increased the soil pH and reduced the soil exchange state Cd content, with a 13.69–17.32% increase in the pH and a 13.22–54.39% reduction in the exchange state Cd content when contrasted with the control, which could promote those Cd converting into unavailable Cd (carbonate-bound form Cd, Fe-Mn oxide-bound form Cd, or residual form Cd) for crops.”

Ma, M., An, N., Wang, Y., Zhao, C., Cui, Z., … W. Z.-J. of H., (2024) Sulfur-containing iron carbon nanocomposites activate persulfate for combined **chemical oxidation and**

microbial remediation of petroleum-polluted soil. Elsevier.

https://www.sciencedirect.com/science/article/pii/S0304389424004680

From the Abstract: "



Abdelfatah, A. M., Fawzy, M., El-Khouly, M. E., & Eltaweil, A. S. (2024). Nitrogen and sulfur-doped biochar supported magnetic CuZnFe2O4 as a sustainable adsorbent for efficient reactive **black dye 5 removal** from industrial wastewater. Biomass Conversion and Biorefinery. https://doi.org/10.1007/S13399-024-05327-5

From the Abstract: "the successful fabrication of CZF@N,S-BC with good magnetic saturation of 12 emu/g and a highly positively charged surface of 32 mV at pH 2. The removal efficiency of RB5 was reached 96.5% at equilibrium time 60 min, and adsorbent dose of 80 mg."

Dong, Q., LeFevre, G., & T. M.-E. science, (2024) Black Carbon Impacts on **Paraburkholderia xenovorans Strain LB400 Cell Enrichment and Activity**: Implications toward Lower-Chlorinated Polychlorinated Biphenyls. ACS Publications.

https://pubs.acs.org/doi/abs/10.1021/acs.est.3c09183

From the Abstract: “Reverse transcription qPCR indicated that BC feedstocks significantly influenced bphA expression in attached cells. The bphA transcript-per-gene ratio of attached cells was >10-fold more than suspended cells, confirmed by transcriptomics. RNA-seq also demonstrated significant upregulation of biphenyl and benzoate degradation pathways on attached cells, as well as revealing biofilm formation potential/cell–cell communication pathways.”

Fitri, E., Mohadi, R., … N. P.-E. and, (2024) Composite Layered Double Hydroxide Zn-Al/Magnetic Biochar Modified for Highly Effective **Malachite Green Adsorption**. Ph02.Tci-Thaijo.Org. https://ph02.tci-thaijo.org/index.php/ennrj/article/view/251149

From the Abstract: “LDH Zn-Al, magnetic biochar, and LDH Zn-Al/magnetic biochar composite had adsorption capacities of 14.472, 15.552, and 25.907 mg/g, respectively, at a temperature of 60°C. Regeneration showed the LDH Zn-Al/magnetic biochar composite had superior and more effective ability compared to LDH Zn-Al and magnetic biochar.”

Hung, N. Van, Nguyet, B., Nghi, N., … N. L.-E., (2024) Visible light-driven photocatalytic **degradation of doxycycline** using ZnO/g-C_3N_4/biochar composite in aqueous solution. Dbpia.Co.Kr. https://www.dbpia.co.kr/Journal/articleDetail?nodeId=NODE11707913

From the Abstract: “The composite exhibits superior photocatalytic degradation ability toward doxycycline, a broad-spectrum antibiotic of the tetracycline compared with individual components (ZnO or g-C_3N_4) and satisfies stability after six treatment cycles.”

Jin, Y., Chen, X., Huang, P., Lin, C., … R. D.-J. of E., (2024) Self-powered Fenton-like process for **propranolol degradation and bacterial inactivation** with Mg-CuO/CeO2/BC composites. Elsevier. https://www.sciencedirect.com/science/article/pii/S2213343724003129

From the Abstract: “PRO (10 μM) was completely degraded within 30 min and E. coli (5.7-log) was inactivated within 20 min due to the synergistic effect between CuO and CeO2. Ce facilitated the circulation of Cu2+/Cu+, thus improving the catalytic efficiency.”

Jin, Y., Yu, J., Yu, J., Wu, Y., Deng, S., Jiang, Y., (2024) Ce/N-Doped biochar prepared based on plant metallurgy strategy: A novel activator of peroxymonosulfate for the **degradation of sulfamethoxazole**. Elsevier. https://www.sciencedirect.com/science/article/pii/S0269749124002720

From the Abstract: "the Ce/N @BC/PMS system achieved to 94.5% degradation of SMX in 40 min at a rate constant of 0.0602 cm−1. The activation center of PMS is widely dispersed Ce oxide nanocrystals, and CeO2 NPs promote the formation of oxygen centered PFR with enhanced catalytic ability and longer half-life."

Li, H., Ouyang, K., Weng, X., Wu, L., Li, X., Shi, Y., … Li, H. (2024). Facile synthesis of KOH and ball milling co-modified wheat straw-derived biochar for the efficient **adsorption of methylene blue** in aqueous solution. https://doi.org/10.21203/rs.3.rs-3894407/v1

From the Abstract: "The maximum adsorption capacity of methylene blue (MB) on KOH-BM-Biochar was found to be 300.66 mg·g− 1, and an adsorption efficiency of 95.00% was achieved within 180 minutes at pH 8.0."

Liu, Z., Tan, C., Zhao, Y., Song, C., Lai, J., Engineering, M. S.-C., (2024) Singlet oxygen in biochar-based catalysts-activated persulfate process: From generation to detection and selectivity **removing emerging contaminants**. Elsevier. https://www.sciencedirect.com/science/article/pii/S1385894724012099

From the Abstract: "The generation of $^1O_2$ in BCs/PS processes is mainly attributed to $SO_5^{\bullet -}$ and $O_2^{\bullet}$. Then, methods to detect $^1O_2$, including quenching experiments, electron paramagnetic resonance (EPR) spectra, solvent exchange, and probe method are reviewed, highlighting the efficacy of multiple methods in mitigating the risk of false positives typical of a single method."

Lu, Y., Feng, M., Engineering, Y. W.-J. of W. P., (2024) Enhancing the heterogeneous electro-Fenton **degradation of methylene blue** using sludge-derived biochar-loaded nano zero-valent iron. Elsevier.

https://www.sciencedirect.com/science/article/pii/S2214714424002125

From the Abstract: "Under a pH of 5, current density of 150 mA, iron to carbon ratio of 1:2, initial concentration of 100 mg·L−1, and plate spacing of 2 cm, the degradation rate and mineralization capacity of methylene blue reached 99.55% and 66.88%, respectively."

Nebrida, A., & Rodolfo, J. S. (2024). Biochar-Based **Water Treatent System** for Sawmill, Villaverde, Nueva Vizcaya. https://doi.org/10.21203/rs.3.rs-3964357/v1

Pan, F., Wei, H., Huang, Y., Song, J., Gao, M., … Z. Z.-J. of C., (2024) **Phosphorus adsorption** by calcium chloride-modified buckwheat hulls biochar and the potential application as a fertilizer. Elsevier.

https://www.sciencedirect.com/science/article/pii/S0959652624006802

From the Abstract: "compared with the soils treated with calcium-containing phosphorus fertilizer (P_2O_5,12%), soils treated with BBC1:1-700 saturated with phosphorus (labelled BBC1:1-700-P) exhibited lower soil bulk weight (from 1.23 to 1.09 g cm−3), increased organic matter content (from 3.62 to 15.83 g kg−1) and phosphorus content (from 0.68 to 1.38 g kg−1), and promoted the growth of buckwheat plants, with root lengths ranging from 1.47 to 4.90 cm and stem lengths ranging from 19.23 to 25.33 cm."

Panghal, V., Singh, A., Arora, D., & Kumar, S. (2024). Biochar-modified constructed wetlands using Eclipta alba as a plant for sustainable **rural wastewater treatment**. Environmental Science and Pollution Research. https://doi.org/10.1007/S11356-024-32144-0

From the Abstract: "Removal efficiency of 93%, 91%, 74% and 77% was observed for BOD, COD, nitrate and sulphate, respectively, in the B25 amendment at HRT 72 h. The highest removal of TKN (67%) was also observed in the B25 amendment at HRT of 72 h."

Priyanka, Vashisht, D., … A. I.-A. S., (2024) **Enhanced Wastewater Remediation** Using Mesoporous Activated Wheat Straw Biochars: A Dye Removal Perspective. ACS Publications. https://pubs.acs.org/doi/abs/10.1021/acssusresmgt.3c00109

From the Abstract: "BC-800 (1:1) followed the Freundlich isotherm (R^2: 0.9659 for RhB, 0.9927 for MB, and 0.9979 for MO, respectively), showing dye molecules form multilayers on the surface of the biochar (π-stacking). Biochar recycling through chemical regeneration demonstrated sustained dye removal efficiency >90% for BC-800 (1:1) over multiple cycles."

Qin, Yongli, Wei, Q., Chen, R., Jiang, Z., Qiu, Y., Jiang, Y., & Li, L. (2024). Roles of red mud-based biochar carriers in the recovery of **anammox activity**: characteristics and mechanisms. Environmental Science and Pollution Research. https://doi.org/10.1007/S11356-024-32263-8

From the Abstract: "The deactivated sludge with added RMBC was recovered rapidly after 31 days, with the specific anammox activity rapidly increasing to 0.84 g N/(g VSS·day), and the recovery efficiency of nitrogen removal rate increased by four times compared to the unadded control. The granulation degree and extracellular polymeric substances secretion of the anammox sludge with the added RMBC were significantly higher than that of the control group."

Sarkar, S, Chakraborty, P., Biorefinery, P. D.-B. C. and, (2024) Synthesis of nano-silica-coated peanut shell-derived bio-char composite for **removal of safranin dye** present in aqueous solution: batch and optimization using. Springer. https://link.springer.com/article/10.1007/s13399-024-05389-5

From the Abstract: "the highest removal of 97.22% was observed with the adsorbent dosage of 2 $g.L^{-1}$, initial dye concentration of 10 $mg.L^{-1}$, at 303 K, pH 8, and agitation speed of 130 rpm."

Selvaraj, R., Nagendran, V., … G. M.-E., (2024) Synthesis of magnetic biochar composite using Vateria indica fruits through in-situ one-pot hydro-carbonization for Fenton-like

catalytic dye degradation. Elsevier.

https://www.sciencedirect.com/science/article/pii/S0013935124003189

From the Abstract: "Within 180 min, almost complete degradation was achieved, with first-order kinetics having rate constants between 0.0299 and 0.0167 min−1. Stability and recyclability studies performed over 7 cycles exhibited unaltered degradation between 93.98 and 97.59%."

Thavaratnam, H., Forestry, S. D.-P. of I., (2024) Removal of **Organics and Phosphate** from Rice Mill Wastewater using Crab Shell Biochar. Journals.Sjp.Ac.Lk. http://journals.sjp.ac.lk/index.php/fesympo/article/view/6974

From the Abstract: "The adsorption capacity of crab shell in treating rice mill wastewater for COD and phosphate were 1040 mg/g and 4.9 mg/g respectively."

Vikal, M., Shah, S., Singh, N., Gupta, M., Singh, P., & Kumar, Y. (2024). Solar Light Active Graphitic Carbon Nitride/Biochar Nanocomposite for **RhB Dye Degradation**. Macromolecular Symposia, 413(1). https://doi.org/10.1002/MASY.202300025

Wang, S., Zhang, M., Chen, X., Bi, Y., Meng, F., Chemosphere, C. W.-, (2024) Effect of biochar on the **SPNA system** at the ambient temperature. Elsevier. https://www.sciencedirect.com/science/article/pii/S0045653524003588

From the Abstract: "the impact of biochar on the single-stage partial nitritation anammox (SPNA) at ambient temperatures (20 °C and 15 °C). The nitrogen removal rate of the system raised from 0.43 to 0.50 g N/(L·d) as the biochar addition was raised from 2 to 4 g/L."

Xiong, S., Zeng, H., Tang, R., Al-Dhabi, N., … W. L.-B., (2024) l-Cysteine and barium titanate co-modified enteromorpha biochar as effective peroxymonosulfate activator for **atrazine treatment**. Elsevier. https://www.sciencedirect.com/science/article/pii/S0960852424001640

From the Abstract: "It has great environmental tolerance and can remove 93.0 % of atrazine (ATZ, 10 mg·L−1) within 60 mins of ultrasonic treatment. The enhanced hydrophilicity, electron-donating capability, and piezoelectricity of LBCBa are considered to induce excellent performance. The apparent reaction rate of the LBCBa-2/PMS/ATZ system with ultrasonic was 2.87 times that without ultrasonic."

Yan, C., Yu, C., Ti, X., Bao, K., & Wan, J. (2024). Preparation of Mn-doped sludge biochar and its catalytic activity to persulfate for **phenol removal**. Environmental Science and Pollution Research. https://doi.org/10.1007/S11356-024-32232-1

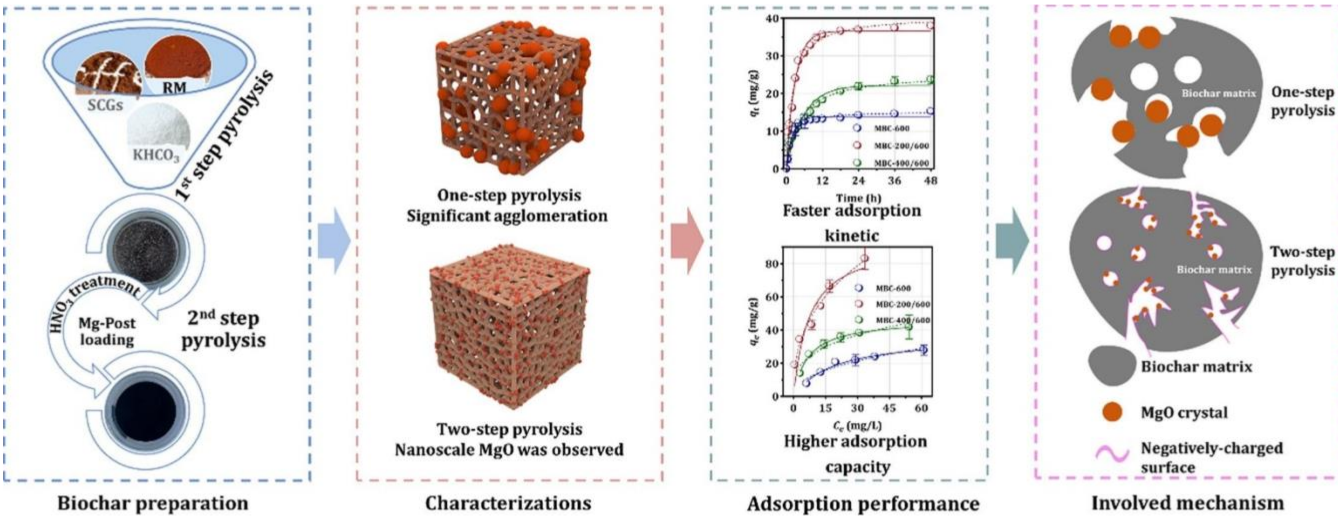
From the Abstract: "under optimal conditions, the Mn@SBC-HP/PDS system achieved 100% removal of 100 mg/L phenol within 180 min, with a TOC removal efficiency of 82.7%. Additionally, the phenol removal efficiency of the Mn@SBC-HP/PDS system remained above 90% over a wide pH range (3–9)."

Yang, J, Long, Q., Zhu, Y., Lin, C., Xu, X., Pan, B., (2024) Multifunctional self-assembled adsorption microspheres based on waste bamboo shoot shells for **multi-pollutant water purification**. Elsevier. https://www.sciencedirect.com/science/article/pii/S0013935124003566

From the Abstract: "The maximum adsorption amounts of BSSBM on Pd(II), Ag(I), TC and MB were 417.3 mg/g, 222.5 mg/g, 97.2 mg/g and 42.9 mg/g, respectively. The adsorption of BSSBM on Pd(II), MB and TC conformed to the quasi-first kinetic model, and the adsorption on Ag(I) conformed to the quasi-second kinetic model. BSSBM showed remarkable selective adsorption capacity for Ag(I) and Pd(II) in a multi-ion coexistence system."

Yin, Y., Xu, Y., Zhao, Z., Luan, Y., Xiao, Y., Purification, C. L.-S. and, (2024) Nanoscale MgO confined in magnetic biochar via two-step pyrolysis for **enhanced phosphate adsorption**. Elsevier. https://www.sciencedirect.com/science/article/pii/S1383586624004933

From the Abstract: "a uniform dispersion of nano-MgO crystals, with their size reduced to less than 10 nm. The P adsorption capacity reached 83.06 mg/g, which was 2.98 times higher than that of biochar via one-step pyrolysis. The mechanism study suggested that the chemical reaction was the driving force in P adsorption on biochar.”



Zeng, Y., Luo, H., He, D., Li, J., Zhang, A., Sun, J., (2024) Influence mechanism of anions on iron doping into swine bone char: Promoting non-radical **oxidation of acetaminophen** in a Fenton-like system. Elsevier. https://www.sciencedirect.com/science/article/pii/S0048969724011215

From the Abstract: “The presence of oxygen vacancies and more carbon defects in the Fe-ClBC catalyst facilitates 1O2 generation, thereby enhancing APAP degradation within the Fe-ClBC/PMS system. This study is dedicated to in-depth exploration of the mechanisms underlying iron doping and defect materials in promoting 1O2 generation.”

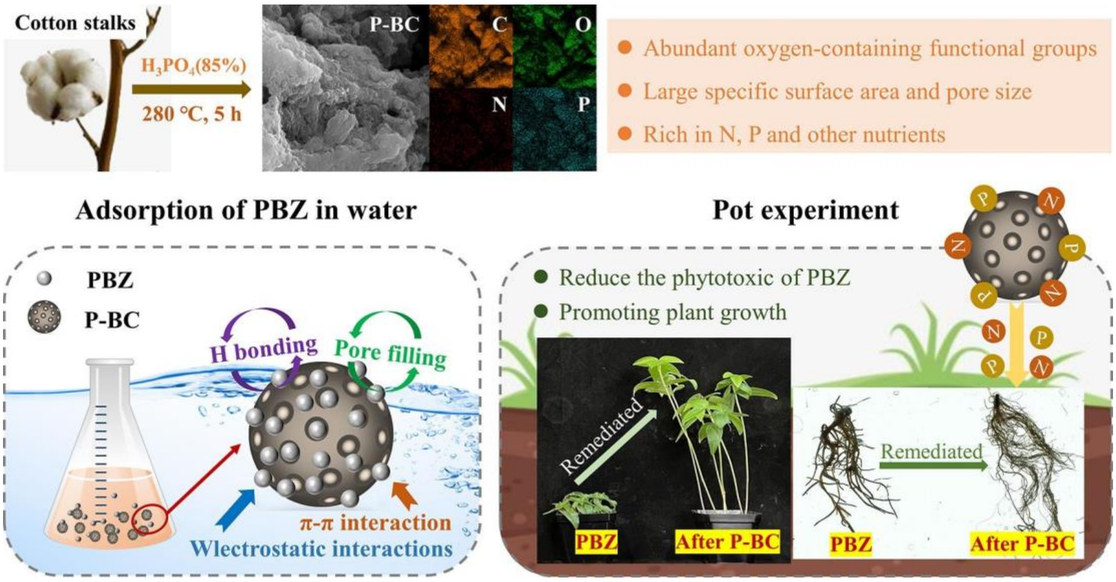
Zhang, F., & Wang, H. (2024). Pyridinic N and semi-ionic F Co-functionalized biochar nanofibers as efficient metal-free electrocatalysts for **oxygen reduction reaction**. Journal of Materials Science. https://doi.org/10.1007/S10853-024-09434-6

From the Abstract: “compared to the mere F-doped BCC-F-900 (onset potential 0.82 V vs. RHE) and N-doped BCC-N-900 (onset potential 0.77 V vs. RHE) catalysts, the BCC-NF-900 catalyst exhibited a markedly enhanced ORR performance, as evidenced by the measured onset potential.”

Zhong, S., Zhang, X., Chen, Y., Yu, K., Huang, Y., … L. L.-C. E., (2024) Phoshporic acid actived biochar for efficient **removal of paclobutrazol** and alleviating its phytotoxicity to mung bean. Elsevier.

https://www.sciencedirect.com/science/article/pii/S0009250924002045

From the Abstract: "The water adsorption capacity of P-BC was 192.89 mg·g−1. The adsorption mechanisms of P-BC included pore filling, hydrogen bonding, weak electrostatic effects, and π-π interactions. Adding 1 % P-BC to soil contaminated with 10 mg·kg−1 PBZ could alleviate PBZ induced phytotoxicity in mung bean seedlings, ensuring the normal growth of roots and plants."



Abbasi, M., Rizvi, O., Hussain, S., … A. J.-C. E., (2024) Nano-zerovalent copper biochar composite for treating **selenium oxyanions** in water: synthesis, evaluation, removal mechanism, density functional theory, and molecular dynamics simulations. Elsevier.

https://www.sciencedirect.com/science/article/pii/S1385894724014402

From the Abstract: "2 g/L of nCu0-BC efficiently removed 98.96 % of selenite [Se(IV)] and 98.78 % of selenate [Se(VI)] in 10 mL of water (10 mg/L for each Se oxyanion) in 12 h."

Apriyono, A., Yuliana, Y., Chen, Z., Keawsawasvong, S., & Kamchoom, V. (2024). The impact of biochar amendment on **soil water infiltration and evaporation** under climate change scenarios. Acta Geophysica. https://doi.org/10.1007/S11600-024-01289-4

Bhatia, D., Engineering, A. S.-J. of W. P., (2024) Biochar derived from pyrolysis of rice straw as an adsorbent for **removal of phenol from water**. Elsevier. https://www.sciencedirect.com/science/article/pii/S2214714424002356

From the Abstract: "The maximum adsorption capacity of biochar was found to be 107.466 mg/g."

Bitencourt, G., Machado, L., … B. P.-J. of the B., (2024) Acidic and Basic Functionalized Biochar from Licuri Nutshell for **Methylene Blue Removal**: A More Sustainable Solution for Wastewater Treatment. SciELO Brasil. https://www.scielo.br/j/jbchs/a/dmQHKxknt4zPGNCtzkLfwMq/?lang=en

From the Abstract: "The licuri nutshell modified biochar (LNMB) presented a maximum adsorption capacity of MB of 826.45 mg g-1, while the non-modified biochar and the commercial activated carbon presented only 5.27 and 142.86 mg g-1, respectively. The recyclability of the adsorbents was evaluated, and there was a loss of efficiency in each cycle for every material."

Cao, Y., on, D. X.-P. of the I. C., & (2024). **Adsorption of Quinoline** from Aqueous Solution by NaOH-treated Biochar derived from Orange Peel: Response Surface Methodology Optimization. Eudl.Eu. https://doi.org/10.4108/eai.24-11-2023.2343432

From the Abstract: "The maximum quinoline removal of 98.01% when initial concentration dsorbent dosage and temperature were 50 mg/L, 0.02g and 40 °C."

Education, S. M.-N. S., (2024) Cost effective and efficient technique for removing **per- and polyfluoroalkyl substances** in water. Wiley Online Library. https://acsess.onlinelibrary.wiley.com/doi/abs/10.1002/nse2.20137

From the Abstract: “Biochar can hold the PFAS in a concentrated area through electrostatic and hydrophobic properties. The degradation method involves using powerful ultraviolet (UV) light, in which free radicals will be produced and help break down PFAS molecules into simpler ones such as carbon and fluorine.”

Guo, K., Wang, H., Mu, T., Chen, J., Luo, H., Reuse, B. H.-W., (2024). Characterization and microbial mechanism of **pollutant removal** from stormwater runoff in the composite filler bioretention system. Iwaponline.Com. https://doi.org/10.2166/wrd.2024.145

From the Abstract: “Microbial community analysis indicated that *Proteobacteria* and *Firmicutes* were the absolute dominant bacteria of the three bioretention systems, and the dominant genera included *Bacillus*, *Hyphomicrobium*, *Micrococcaceae*, and *Nitrospira*. In addition, the total number of denitrifying functional bacteria genera in systems 2# and 3# was increased by 1.39 and 52.1% compared to system 1#.”

He, J., Boersma, M., Song, Z., Krebsbach, S., Chemosphere, D. F.-, (2024) Biochar and surfactant synergistically enhanced **PFAS destruction** in UV/sulfite system at neutral pH. Elsevier. https://www.sciencedirect.com/science/article/pii/S0045653524004557

From the Abstract: “The performance of UV/sulfite/BSS was further optimized and used for the degradation of four PFAS. At the optimal experimental condition, the UV/sulfite/BSS system can completely degrade PFOA with >30% defluorination efficiency for up to five continuous cycles (n = 5). Overall, our BSS provides a cost-effective and sustainable technique to effectively degrade PFAS in water under environmentally relevant pH conditions.”

Hsieh, M. (2024). ADSORPTION CHARACTERISTICS OF **SELECTIVE NITROGEN SPECIES** ON BIOCHAR IN AQUEOUS SOLUTION. https://udspace.udel.edu/items/bf22a050-4483-4c2d-815a-579de8414d61

Hu, S., Luo, H., Li, C., Yi, K., Song, J., Ji, C., (2024) **Selective recovery of high purity aluminium phosphate** from incinerated sewage sludge ash with Zr-modified biochar. Elsevier. https://www.sciencedirect.com/science/article/pii/S0959652624009119

> **From the Abstract:** "0.1 mol/L H2SO4 was chosen to extract phosphorus from ISSA with a phosphorus extraction of 54.5 ± 1.6 mg/g. Phosphorus was selectively adsorbed by the Zr-RB adsorbent with a maximum adsorption capacity of 53.1 ± 0.6 mg/g"

Mai, S. (2024). Cost effective and efficient technique for removing **per- and polyfluoroalkyl substances in water**. Natural Sciences Education, 53(1). https://doi.org/10.1002/NSE2.20137

Masmoudi, M. A., Abid, N., Feki, F., Karray, F., Chamkha, M., & Sayadi, S. (2024). Study of **olive mill wastewater adsorption** onto biochar as a pretreatment option within a fully integrated process. Euro-Mediterranean Journal for Environmental Integration. https://doi.org/10.1007/S41207-024-00464-9

> **From the Abstract:** "Organic matter removal reached a maximum value of 28% for the highest biochar mass and the lowest OMW concentration, while biochar adsorption capacity attained an optimal value of 140 mg g−1 for the lowest biochar mass and the highest OMW concentration."

Mo, Y., Meng, X., Liu, C., Xu, W., Zheng, L., Chen, F., … Chen, Z. (2024). Performance and mechanism of biochar@FeMg-LDH for efficient activation of **persulfate for degradation** of 2, 4-dichlorophenol in groundwater. Environmental Science and Pollution Research. https://doi.org/10.1007/S11356-024-32456-1

> **From the Abstract:** "The removal efficiency of the catalyst exceeded 95%, showing high oxidation activity in a wide pH range while being almost unaffected by reducing substances and ions in the environment... According to quenching experiments and electron paramagnetic resonance spectroscopy, the main active

species during BC@FeMg-LDH/PDS degradation of 2, 4-DCP is $^1O_2$, indicating a non-radical reaction mechanism dominated by $^1O_2$."

Nasir, M., & Syafika, A. (2024). Investigation of solid digestate-derived biochar as effective adsorbent for **removal of polycyclic aromatic hydrocarbons (PAHs)** from industrial wastewater. https://open.library.ubc.ca/soa/cIRcle/collections/ubctheses/24/items/1.0440020

From the Abstract: "The results revealed that biochar PSD-B500 exhibited superior characteristics with a higher specific surface (249 m²/g), micropore volume (0.106 cm³/g) and acidic functional groups (6.64 mmol/g) than SSD biochar (SSD-B500) (31.9 m2/g, 0.0019 cm3/g, 5.39 mmol/g). This suggests that PSD is a favourable feedstock for producing high-quality biochar."

Nguyen, T., Research, V. P.-A. E., (2024) Ball-Milled Biochar from Waste Bamboo Chopsticks: A Potential Adsorbent for **Methylene Blue Removal**. Ph01.Tci-Thaijo.Org. https://ph01.tci-thaijo.org/index.php/aer/article/view/253487

From the Abstract: "the optimal adsorption conditions, such as pH solution, MB concentration, dose of BM-WBCB, and contact time at 10, 30 mg L-1, 0.3 mg, and 60 min, respectively. With a maximal adsorption capacity of 4.2 mg g-1, monolayer adsorption…"

Nidheesh, P., Kumar, M., Venkateshwaran, G., Chemosphere, S. A.-, (2024) Conversion of locally available materials to **biochar and activated carbon for drinking water treatment**. Elsevier. https://www.sciencedirect.com/science/article/pii/S0045653524004594

Omorogie, M. O., & Helmreich, B. (2023). Exploring the Potential of Amino-Functionalized Zeolite Series/H3PO4-Biochar for Environmental **Microplastic Removal**. Industrial and Engineering Chemistry Research. https://doi.org/10.1021/ACS.IECR.3C03971

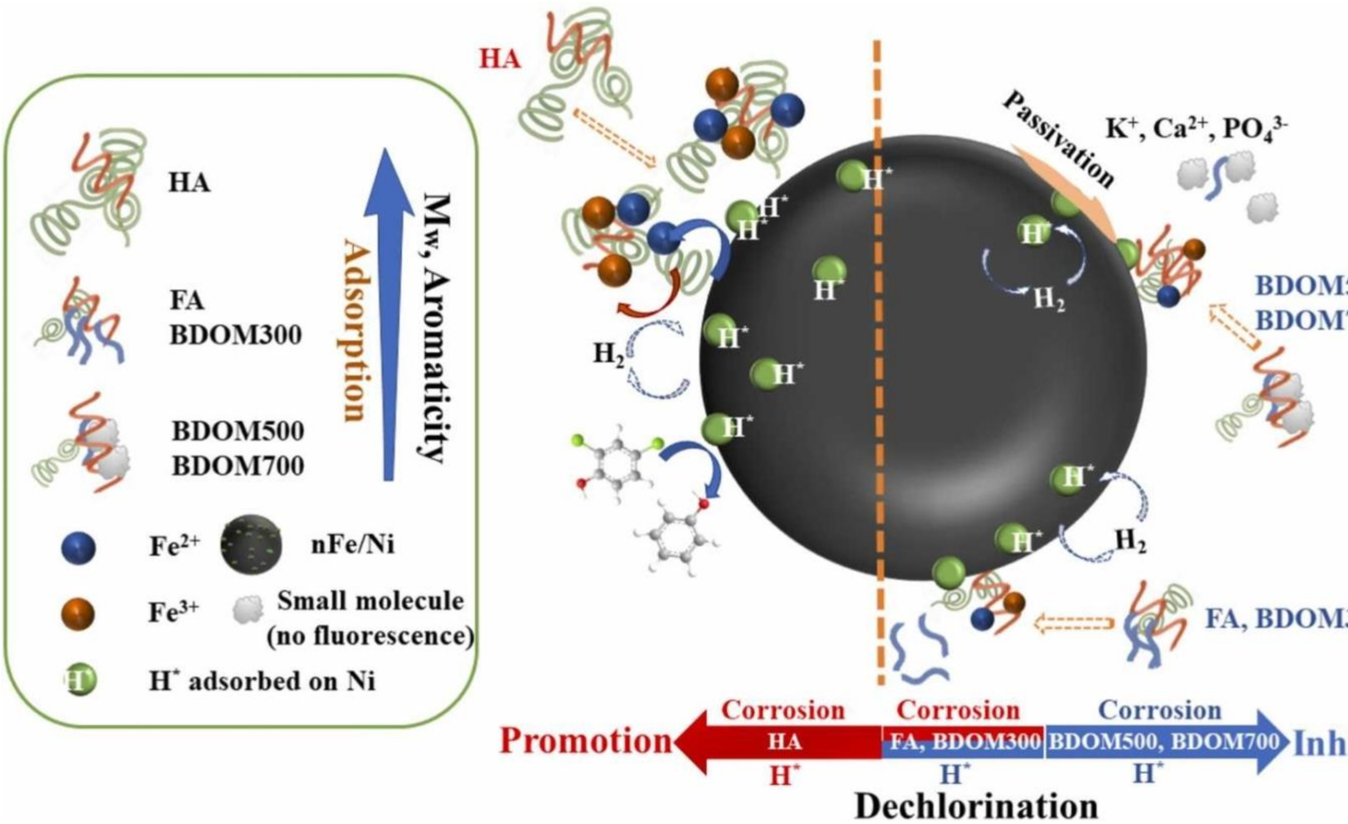
From the Abstract: “Findings from this research showed that AFZ removed 4.78 to 4.85 mg g–1 of polystyrene MPs from solutions at 20 to 50 °C, respectively. This was achieved by a combination of chemisorption and physisorption mechanisms via hydrophobic interactions between the π-electrons of the sp2 carbon orbital and π–π aromatic moieties of AFZ and the π-electrons of the polystyrene MPs and electrostatic attraction between AFZ and polystyrene MPs, respectively.”

Parashar, N., Engineering, S. H.-J. of W. P., (2024) Cetyl trimethyl ammonium bromide-modified magnetic **biochar-integrated sand filter** for microplastics removal from secondary-treated sewage effluents: Performance evaluation and mechanistic insights. Elsevier. https://www.sciencedirect.com/science/article/pii/S2214714424002678

From the Abstract: “Optimal conditions yielded a maximum MPs removal of >97 % with MBC-CTAB at 7 mg/50 mL, pH 4, mixing speed of 180 rpm for 3 min during batch studies. Adsorption kinetics followed the pseudo-second-order model (R2 = 0.91), and the Langmuir model (R2 = 0.94) described the adsorption isotherm with a maximum capacity of 247 mg/g. Column studies removed ∼98 % MPs in real-time secondary sewage effluents”

Ri, C., Kim, M., Mun, H., Liu, L., Materials, J. T.-J. of H., (2024) Unveiling the effect of different **dissolved organic matter (DOM)** on catalytic dechlorination of nFe/Ni particles: corrosion and passivation effect. Elsevier. https://www.sciencedirect.com/science/article/pii/S0304389424004801

From the Abstract: “



Saleh, A., Alias, A., Mahdi, H., … A. J.-N. J. of, (2024) Characterizing Biochar Derived from Palm Kernel Shell Biomass via Slow Pyrolysis for **Adsorption Applications**. 192.53.163.162. http://192.53.163.162/index.php/NTU-JRE/article/view/729

Shan, S., Lv, Z., B, H. W.-M. S. and E., (2024) A novel readily recyclable Fe3O4/ZnO/loofah biochar composite for efficient **degradation of organic pollutants** under visible light. Elsevier. https://www.sciencedirect.com/science/article/pii/S0921510724001016

From the Abstract: "the 20 % FZLB catalyst demonstrated the greatest photocatalytic activity, achieving 96.5 % phenol degradation following 90 min of visible light exposure alone. Notably, the material could be quickly retrieved in 90 s, making it highly efficient for use in managing mechanical wastewater when visible light is present."

Surana, D., Patel, P., Ghosh, P., Sharma, S., … V. K.-J. of, (2024) **Microplastic Fibers** in Different Environmental Matrices from Synthetic Textiles: Ecotoxicological Risk, Mitigation Strategies, and Policy Perspective. Elsevier. https://www.sciencedirect.com/science/article/pii/S2213343724004639

Tang, F., Dai, H., Yang, X., Li, W., Chemical, B. W.-J. of E., (2024) Nitrogen and sulfur co-doped watermelon rind as an ordered mesoporous biochar activated peroxymonosulfate (PMS) for **efficient tetracycline degradation**. Elsevier. https://www.sciencedirect.com/science/article/pii/S2213343724004329

From the Abstract: "N, S co-doped/biochar (NSBC) with high adsorption and catalytic properties was successfully prepared from watermelon rind waste for the first time, and showed excellent performance in the degradation of tetracycline by activated peroxymonosulfate, with the degradation rate of TC reaching 90.02% in 40 min."

Xie, X., Xie, Y., Zuo, K., Wu, J., Fu, S., … W. L.-J. of C., (2024) Nanosized lanthanum peroxide–loaded biochar composites for simple and effective **glyphosate removal from wastewater**: Behavior and mechanisms. Elsevier. https://www.sciencedirect.com/science/article/pii/S0959652624008990

From the Abstract: "The mechanism for glyphosate removal was found to be a combined process of electrostatic attraction, oxidation, and inner-sphere complex formation. Most glyphosate could be oxidized to H2PO 4− by breaking the C–N bonds, and H2PO4− could be attracted to the material surface simultaneously by electrostatic attraction, forming La–O–P inner-sphere complexes."

Xu, Q., Li, C., Sumita, & Pang, W. (2024). Study on the removal efficacy and mechanism of **phosphorus** from wastewater by eggshell-modified biochar. Water Environment Research, 96(3). https://doi.org/10.1002/WER.10998

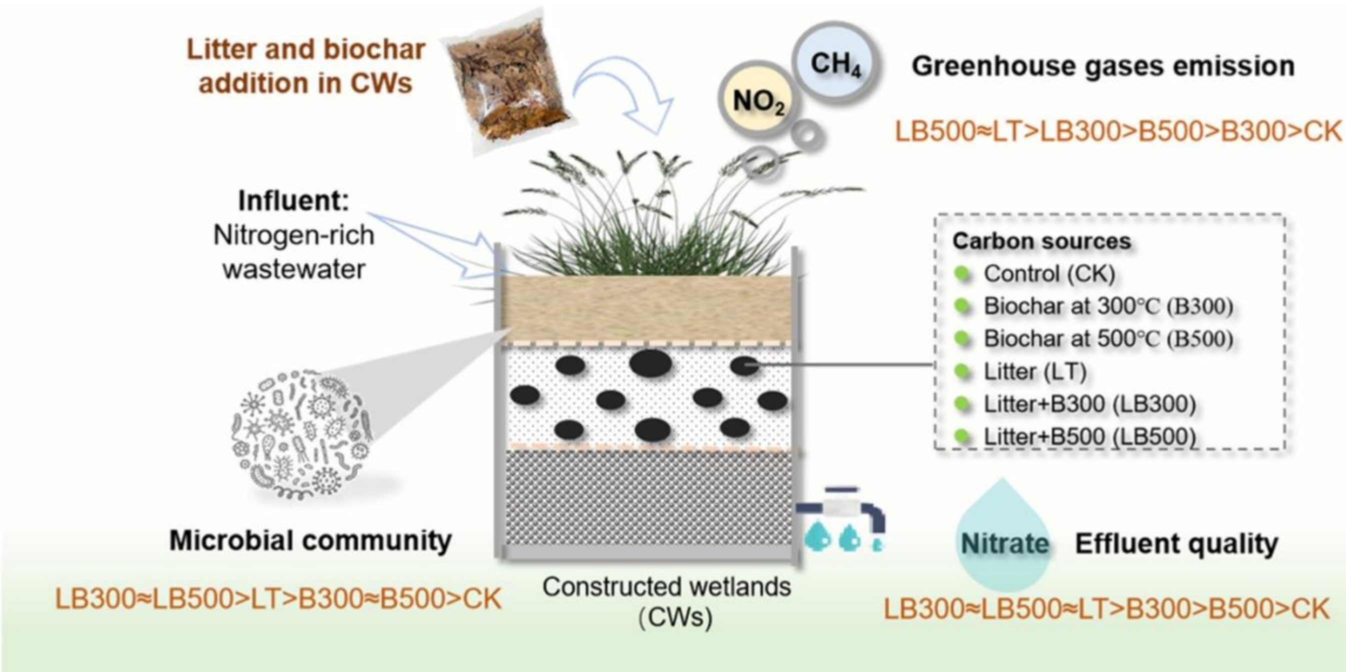
From the Abstract: "Under optimal conditions, the phosphorus adsorption capacity of EGBC was measured to be 288.83 mg/g."

Yang, F., Xing, L., Zhong, X., Liu, Y., Guo, Z., … J. Y.-S. and, (2024) **Volatile acetic acid selective adsorption** by biomass-derived activated carbon with humidity-resistance: Tunable implanting and activation approach of activator. Elsevier. https://www.sciencedirect.com/science/article/pii/S1383586624006300

From the Abstract: "Based on various optimization conditions, the optimal sample, BAC900, displays remarkable structural features (SBET = 2302 m2/g, Vtotal = 1.968 cm3 g−1, V>2nm = 1.474 cm3 g−1), achieving exceptional acetic acid adsorption efficiency (24.105 mmol g−1)."

Zhou, T., Hu, W., Lai, D., Yin, G., Ren, D., Guo, Z., (2024) Interaction of **Reed Litter and Biochar** Presences on Performances of Constructed Wetlands. Elsevier. https://www.sciencedirect.com/science/article/pii/S0043135424002896

From the Abstract: "the combined addition of reed litter and 300 °C-heated biochar significantly decreased nitrous oxide (30.7 %) and methane (43.9 %) compared to reed litter addition alone, while the combined addition of reed litter and 500 °C-heated biochar did not."



Şensoy, R., Kabak, B., & Kendüzler, E. (2024). Kinetic and isothermal studies of **naproxen adsorption** from aqueous solutions using walnut shell biochar. Reaction Kinetics, Mechanisms and Catalysis. https://doi.org/10.1007/S11144-024-02586-1

Tao, Z., Liu, Y., Li, S., Li, B., Fan, X., Liu, C., (2024) Global warming potential assessment under reclaimed water and livestock wastewater irrigation coupled with **co-application of inhibitors and biochar**. Elsevier. https://www.sciencedirect.com/science/article/pii/S0301479724001294

> **From the Abstract:** "irrigation of unconventional water resources exacerbated global warming potential (GWP). All exogenous substance treatments increased CO_2 and CH_4 emissions and suppressed N_2O emissions, independent of the type of water, compared to no substances (NS). The inhibitors were ineffective in reducing the GWP whether or not in combination with biochar, and the combined application of inhibitors with biochar further increased the GWP."

Verma, A., Sharma, G., Kumar, A., Dhiman, P., Chemosphere, G. M.-, (2024) **Microplastic pollutants** in water: A comprehensive review on their remediation by adsorption using various adsorbents. Elsevier. https://www.sciencedirect.com/science/article/pii/S0045653524002583

Wang, YQ, Ding, J., Pang, J., Wu, C., … H. S.-B., (2024) Promotion of **anaerobic biodegradation of azo dye RR2** by different biowaste-derived biochars: Characteristics and mechanism study by machine learning. Elsevier. https://www.sciencedirect.com/science/article/pii/S0960852424000865

> **From the Abstract:** "The addition of biochar resulted in a 31.5 % to 44.6 % increase in decolorization efficiency and favorable decolorization stability. Biochar promoted extracellular polymeric substances (EPS) secretion, especially humic-like and fulvic-like substances."

Zhang, G., Xue, J., Zhang, Y., Ye, J., Zhang, N., … L. F.-J. of H., (2024) Significantly **enhanced biodegradation of profenofos** by Cupriavidus nantongensis X1T mediated by walnut shell biochar. Elsevier. https://www.sciencedirect.com/science/article/pii/S0304389424003297

From the Abstract: "Profenofos degradation experiments showed that strain X1^T immobilized on biochar significantly decomposed profenofos (shortened the half-life by 5.2 folds) by promoting the expression of the degradation gene *opdB* and the proliferation of strain X1^T. The immobilized X1^T showed stronger degradation ability than the free X1^T at higher initial concentration, lower temperature and pH. The immobilized X1^T could maintain 83% of removal efficiency for profenofos after 6 reuse cycles in paddy water."

Zhang, X, Xiong, Y., Wang, X., Wen, Z., Xu, X., … J. C.-S. of T. T., (2024) MgO-modified biochar by modifying hydroxyl and amino groups for selective **phosphate removal**: Insight into phosphate selectivity adsorption mechanism through experiment and theoretical. Elsevier. https://www.sciencedirect.com/science/article/pii/S0048969724007083

From the Abstract: "The OH/NH2@MBC shows an excellent phosphate adsorption capacity (43.27 mg/g) and desorption ratio (82.34 %) after five cycles under the condition of anion coexistence (100 mg/L)."

Zhu, Q., Liu, X., Xu, X., Dong, X., Xiang, J., … B. F.-E., (2024) Mn–Co–Ce/biochar-based particles **electrodes for removal of COD** from coking wastewater by 3D/HEFL system: Characteristics, optimization, and mechanism. Elsevier. https://www.sciencedirect.com/science/article/pii/S0013935124002639

From the Abstract: "MCCBC particle electrodes had excellent electrochemical degradation performances of COD in coking wastewater, and the COD removal and degradation rates of the 3D/HEFL system were 85.35% and 0.0563 min−1 respectively. RSM optimized conditions revealed higher COD removal rate at 89.23% after 31.6 min of electrolysis."

Abyaneh, M. R., Reports, G. N. B.-S., (2024) **Pb (II), Cd (II), and Mn (II) adsorption** onto pruning-derived biochar: physicochemical characterization, modeling and application in real landfill leachate. Nature.Com. https://www.nature.com/articles/s41598-024-54028-6

From the Abstract: "Biochar pyrolyzed at 700 °C with a particle size of 63–75 µm (i.e., Lv700-63) showed the highest removal efficiency performance. Pb and Cd ions were completely removed (100%) by 0.2 g L−1 Lv700-63 at 7.0 pH and contact times of 120 and 90 min, respectively. The maximum percentage removal of Mn was 86.20% at optimum conditions of 0.2 g L−1 Lv700-63 dosage, 7.0 pH, and 180 min contact time."

Adebajo, S., Bankole, P., Ojo, A., Microbe, P. A.-T., (2024) Screening and Optimization of **Polyhydroxybutyrate (PHB)** by Lysinibacillus fusiformis from Diverse Environmental Sources. Elsevier. https://www.sciencedirect.com/science/article/pii/S2950194624000104

From the Abstract: "Tomato biochar soil, among other sample collection sources, recorded the highest PHB producers. Lysinibacillus fusiformis strain SO1 (PP065491.1) proved to be the most efficient bio plastic producer."

Alhajeri, N., Tawfik, A., Nasr, M., Chemosphere, A. O.-, (2024) Artificial intelligence-enabled optimization of Fe/Zn@ biochar photocatalyst for **2, 6-dichlorophenol removal** from petrochemical wastewater: A techno- economic perspective. Elsevier. https://www.sciencedirect.com/science/article/pii/S0045653524003692

From the Abstract: "The ANN prediction accuracy was expressed as R2 = 0.967 and mean squared error = 5.56e–22. The ANN-based optimized condition depicted that over 90% of 2,6-DCP could be eliminated under C0 = 130 mg/L, pH = 2.74, and catalyst dosage = 168 mg/L within ~4 h. This optimum condition corresponded to a total cost of $7.70/m3, which was cheaper than the price estimated from the unoptimized photocatalytic system by 16%."

Gajendiran, V., Deivasigamani, P., … S. S.-D. and W., (2024) BIOCHAR FROM Manihot esculenta STALK AS POTENTIAL ADSORBENT FOR **REMOVAL OF REACTIVE YELLOW DYE**. Elsevier. https://www.sciencedirect.com/science/article/pii/S1944398624001413

From the Abstract: "At an equilibrium period of 25 min, pH of 7, bio-char dosage of 2 g, temperature of 25 °C, agitation speed of 150 rpm, as well as particle size of 231 µm, 86% of the dye could be removed with highest adsorption capacity of 53.47 mg/g."

He, R., Hui, K., Zhang, X., Sciences, H. Y.-A., (2024) Insight into the Role of the Pore Structure and Surface Functional Groups in Biochar on the **Adsorption of Sulfamethoxazole** from Synthetic Urine. Mdpi.Com. https://www.mdpi.com/2076-3417/14/5/1715

Ilyas, M., Liao, Y., Xu, J., Wu, S., Liao, W., Water, X. Z.-D. and, (2024) **Removal of anthracene** from vehicle-wash wastewater through adsorption using eucalyptus wood waste-derived biochar. Elsevier. https://www.sciencedirect.com/science/article/pii/S194439862400136X

From the Abstract: "the most effective conditions to achieve maximum anthracene adsorption (98.40%) were as follows: an initial concentration of 40 ppm, a contact time of 60 min, a pH level of 5, a temperature of 50 °C, and an adsorbent dose of 0.4 g."

Wang, Y., Chen, L., Zhu, Y., Fang, W., Tan, Y., … Z. H.-E. S., (2024) Research status, trends, and mechanisms of biochar adsorption for **wastewater treatment**: a scientometric review. Springer. https://link.springer.com/article/10.1186/s12302-024-00859-z

Aboulsoud, Y. I. E. (2024). **Biosorptive removal of fluoride** from wastewater using tea domestic waste biochar. Environment, Development and Sustainability. https://doi.org/10.1007/S10668-024-04598-2

From the Abstract: "The highest biosorption efficacy achieved was 109.18 mg F^-/g biochar using the H-modified form under the optimum conditions of biochar dosage: pH: 2, 0.25 g/l, temperature: 50 °C, initial concentration of F^-: 500 mg/l, exposure time: 30 min, and agitation rate: 300 rpm. The OH-modified form achieved less than half biosorption efficacy which reached 49.39 mg F^-/g biochar."

Almuktar, S., Abed, S., Environments, M. S.-, (2024) Biomass Production and Metal Remediation by Salix alba L. and Salix viminalis L. Irrigated with **Greywater** Treated by Floating Wetlands. Mdpi.Com. https://www.mdpi.com/2076-3298/11/3/44

Benakcha, M., Treatment, T. M.-D. and W., (2024) Effect of adding biochar from prickly pear skin to aluminium sulphate to improve the coagulation-flocculation process during the **elimination of humic substances** present in the Laghrous drainage canal Water, Zab El-gharbi region (SE Algeria). Elsevier. https://www.sciencedirect.com/science/article/pii/S1944398624001620

From the Abstract: "simple coagulation flocculation remove only 66% of Chemical oxygen demand (COD) of initial value and the presence of powdered activated carbon (40 mg.L-1) increases efficiency up to 82%."

CERNICA, G., CONSTANTIN, M., & DUMITRESCU, I. (2024) Research on the possibilities of evaluation and recovery of sludge from sewage treatment plants from the perspective of. Cms.Gnest.Org. https://cms.gnest.org/sites/default/files/Proceedings/cest2023_00593/cest2023_00593.pdf

Kaya, N., & Uzun, Z. Y. (2024). Experimental and modeling studies on the **removal of bromocresol green** from aqueous solutions by using pine cone-derived activated biochar. Biomass Conversion and Biorefinery. https://doi.org/10.1007/S13399-024-05441-4

From the Abstract: "Batch adsorption experiments involved varying pH, temperature, contact time, adsorbent dosage, and initial dye concentrations and the maximum BCG removal (96.27%) occurred at pH: 2.0, T: 45 °C, m: 2 g/L, t: 15 min., and Co: 25 mg/L."

Kochito, J., Gure, A., Abdissa, N., … T. B.-T. S. W., (2024) MnOx-Coffea arabica Husk and Catha edulis Leftover Biochar Nanocomposites for Removal of **Methylene Blue from Wastewater**. Hindawi.Com. https://www.hindawi.com/journals/tswj/2024/7585145/

From the Abstract: "the pristine biochar of CH and KL removed 39.08% and 75.26% of MB from aqueous solutions, respectively. However, the MnOx-BNCs removed 99.27% with manganese oxide-coffee husk biochar nanocomposite (MnOx-CHBNC) and 98.20% with manganese oxide-khat leftover biochar nanocomposite (MnOx-KLBNC) of the MB, which are significantly higher than their corresponding pristine biochars."

Lingamdinne, L., Angaru, G., Pal, C., Reports, J. K.-S., (2024) Insights into kinetics, thermodynamics, and mechanisms of chemically activated sunflower stem biochar for **removal of phenol and bisphenol-A** from. Nature.Com. https://www.nature.com/articles/s41598-024-54907-y

From the Abstract: "The resulting material exhibited exceptional properties, such as a high specific surface area (452 m2/g) and excellent adsorption capacities for phenol (333.03 mg/g) and bisphenol A (BPA) (365.81 mg/g). The adsorption process was spontaneous and exothermic, benefiting from the synergistic effects of hydrogen bonding, electrostatic attraction, and stacking interactions."

🔓 Wu, X., Quan, W., Chen, Q., Gong, W., Molecules, A. W.-, (2024) Efficient Adsorption of **Nitrogen and Phosphorus in Wastewater** by Biochar. Mdpi.Com. https://www.mdpi.com/1420-3049/29/5/1005

🔓 Xie, H., Chen, R., Song, Y., Shen, Y., Song, F., He, B., (2024) Myriophyllum Biochar-Supported Mn/Mg Nano-Composites as Efficient Periodate Activators to Enhance **Triphenyl Phosphate Removal** from Wastewater. Mdpi.Com. https://www.mdpi.com/1996-1944/17/5/1118

From the Abstract: "the Mn/Mg@MV composite showed strong radical self-producing capacities. The Mn/Mg@MV system degraded 93.34% TPhP (pH 5, 10 μM) within 150 min. The experimental results confirmed that the predominant role of IO3· and the auxiliary ·OH jointly contributed to the TPhP degradation."

🔓 Xin, H., Yang, J., Lu, Y., Xiao, H., Wang, H., Eltohamy, K. M., … Liang, X. (2024). Potentials of emergent plant residue derived biochar to be alternative **carbon-based phosphorus fertilizer** by Fe(II)/Fe(III) magnetic modification. Biochar, 6(1). https://doi.org/10.1007/S42773-024-00300-X

From the Abstract: "Within the range of 0.8–43.0 mg L−1 in solution, the adsorption capacities of P by MB-A, MB-C, and MB-T were 304.6–5658.8, 314.9–6845.6, and 292.8–5590.0 mg kg−1, with adsorption efficiencies of 95.2–32.9%, 98.4–39.8%, and 91.5–32.5%, respectively. The primary mechanisms that caused P to adsorb onto the MBs were inner-sphere complexation and electrostatic attraction."

🔓 Xue, X., Chen, B., Lu, H., Gao, H., Yao, M., & Environmental, B. L.-P. J. of. (2024) Characterization and Performance of Sludge Derived Biochar as Conditioner in **Textile Wastewater Sludge Dewatering**. Pjoes.Com. https://www.pjoes.com/pdf-175019-104639?filename=104639.pdf

From the Abstract: "Compared with raw sludge, the sludge specific resistance to filtration (SRF) decreased by 77.14%, and the moisture content of sludge decreased from 85.38% to 67.08%. In addition, the chemical oxygen demand (COD), turbidity and chromaticity of supernatant decreased by 32.50%, 89.20% and 77.50%, respectively. It was found that the synergistic effect existed between the two conditioners."

Charnkeitkong, P., Materials, S. S.-K. E., (2024) Effects of **Cupric Ion Adsorption** onto the Modified Pineapple Pulp as a Biochar Adsorbent. Trans Tech Publ. https://www.scientific.net/KEM.974.57

From the Abstract: "A high surface area of the carbonized pineapple pulp as a fine adsorbent was found to effectively cupric ion adsorption capacity, the maximum cupric ion removal efficiency of 83.4% and 41.9 mg/g of adsorption capacity at a pH of 6.0 was attained after 30 minutes to equilibrium reach, initial feed concentration of copper (II) sulfate 5-hydrate (CuSO4 . 5H2O) 250 ppm and temperature 50 °C."

de Lima Carvalho, F., dos Santos, J. P., Knani, S., Alruwaili, A., da Rosa Schio, R., Lütke, S. F., … Dotto, G. L. (2024). Valorization of winemaking residues as biochar for **removing Ni (II)** from real industrial painting process effluent in a fixed-bed column. Environmental Science and Pollution Research. https://doi.org/10.1007/S11356-024-32385-Z

From the Abstract: "In this condition, the maximum adsorption capacity of the column was 0.452 mg g−1, the mass transfer zone (Zm) was 3.3 cm, the treated effluent volume (Veff) was 9.72 L, and the nickel removal (R) was 92.71%."

Fu, W., Wu, M., Chen, Q., Liang, Y., Peng, H., … L. Z.-J. of H., (2024) The role of superoxide anion to **Cr (VI) reduction** by pine biochar. Elsevier. https://www.sciencedirect.com/science/article/pii/S0304389424003844

From the Abstract: "The reduction content of Cr(VI) was 1.5 times higher in untreated conditions than in anaerobic conditions. The disappearance of $\cdot O_2^-$ under anaerobic conditions illustrated that $\cdot O_2^-$ may be involved in the reduction of Cr(VI). Quenching of $\cdot O_2^-$ resulted in a decrease of Cr(VI) reduction by 34%, while $^1O_2$ was negligible, probably due to the stronger electron-donating capacity of $\cdot O_2^-$. The degradation of nitrotetrazolium blue chloride (quenching agent of$\cdot O_2^-$) confirmed that the reduction process of$\cdot O_2^-$ mainly occurred in the liquid-phase."

Jin, Z., Xue, Z., Li, B., Ou, L., Yan, L., Yang, L., (2024) High-performance spent coffee grounds-based 3D microporous biochar for the **efficient capture of Cd2+** via a multi-pathway mechanism. Elsevier. https://www.sciencedirect.com/science/article/pii/S1385894724010222

From the Abstract: "The adsorption capacity of PAC-SH-140 for Cd2+ was 205 mg/g, which is 2.7 times higher than that of PAC (75 mg/g). Besides complexation, cation-π coordination and electrostatic interaction, Cd2+ was also reduced to Cd0 under the action of sulfoxide. The adsorption capacity of PAC-SH-140 was improved via these multi-pathway mechanisms."

Lima, J., Ogura, A., Espíndola, E., Chemosphere, E. da S.-, (2024) Post-sorption of **Cd, Pb and Zn** onto peat, compost, and biochar: Short-term effects of ecotoxicity and bioaccessibility. Elsevier. https://www.sciencedirect.com/science/article/pii/S0045653524004144

From the Abstract: "compost < biochar < peat for Pb, and compost < peat < biochar for Cd and Zn. There was a significant growth inhibition for Eruca sativa and Zea mays exposed to increasing concentrations of PTMs treated with peat and compost. The presence of contaminants played a decisive role on immobilization of neonates of Ceriodaphnia silvestrii after treatments with compost and, especially, peat."

Sayın, F., & Akar, S. (2024) Enhanced **Heavy Metal Sorption** by Eco-Friendly Biochars. Avesis.Ogu.Edu.Tr. https://avesis.ogu.edu.tr/yayin/87183631-adae-4450-ae49-306e87d716d7/enhanced-heavy-metal-sorption-by-eco-friendly-biochars

Shen, H., Zhou, C., Xu, S., Huang, Y., Shi, J., Liu, G., … Dou, C. (2024). Study on the solidification performance and **mechanism of heavy metals** by sludge/biomass ash

ceramsites, biochar and biomass ash. Environmental Geochemistry and Health, 46(3). https://doi.org/10.1007/S10653-023-01846-8

Singh, K., Prasad, B., Dave, H., Kumari, M., Dubey, D., Sillanpää, M., Prasad, K. S. (2024). Study of **chromate (VI) removal** via sequential combined Fenton's process and adsorption by nano-magnesium oxide-modified wood biochar for tannery wastewater treatment. Clean Technologies and Environmental Policy. https://doi.org/10.1007/S10098-024-02762-W

From the Abstract: "This enhancement led to impressive removal percentages of COD, NH3–N, NO32−, PO42−, and Cr(VI),of 93, 88, 79, 8, and 98%, respectively. The equilibrium data exhibited a strong alignment with the Langmuir isotherm model, underscoring a remarkable adsorption capacity of 102.74 mg g−1."

Vaičiukynienė, D., Alaburdaitė, R., Nizevičienė, D., & Tamošaitis, G. (2024). Sorption properties of **Pb2+ ions** from water by alkali activated slag/biochar composites. Biomass Conversion and Biorefinery. https://doi.org/10.1007/S13399-024-05434-3

From the Abstract: "The maximum sorption capacity of Pb2+ was found to be 395.0 mg/g for the sample S2 (0.100 g) made from alkali activated slag with 15.4 wt% of biochar at an initial concentration of 1000 mg/L. Ion exchange and chemisorption dominated the mechanism of Pb2+ sorption using the alkali activated slag and biochar composites, and precipitation can occur because of complex formation during adsorption."

Wu, Y., Feng, H., Tang, J., Yang, Z., Lan, C., Guo, Y., & Tang, L. (2024). Selective Capacitive **Removal of Pb2+** from Wastewater over Biochar Electrodes by Zinc Regulation. Small. https://doi.org/10.1002/SMLL.202311401

From the Abstract: "electrochemistry of biochar by Zn doping is reported, which suggests a high renewable capacity (20 mg g^{-1}) and outstanding selective capacitive removal ability (SCR) of Pb^{2+} from leachate. The SCR efficiency of Pb^{2+} is as high as 99% compared to K^+ (8%), Na^+ (13%), and Cd^{2+} (37%)."

Xu, H., Zhou, Q., Yan, T., Jia, X., Lu, D., Ren, Y., (2024) Enhanced **removal efficiency of Cd2+ and Pb2+** from aqueous solution by H3PO4–modified tea branch biochar: Characterization, adsorption performance and mechanism. Elsevier. https://www.sciencedirect.com/science/article/pii/S2213343724003130

From the Abstract: "Its maximum adsorption capacities of Cd2+ and Pb2+ were 98.25 mg g−1 and 127.5 mg g−1 at the pH 6 and dosage of 2 g L−1, which was 1.5 and 1.3 folds of the pristine biochar, respectively."

Zhan, X., Chi, J., Yu, H., Fang, L., Liu, T., Du, Y., (2024) Biogeochemical mechanisms of zero-valent iron and biochar for synergistically **mitigating antimony uptake** in rice. Elsevier. https://www.sciencedirect.com/science/article/pii/S1001074224000287

From the Abstract: "the combination treatment of 0.05 % ZVI and 0.095% BC resulted in a significant decrease (42.8%) in Sb accumulation in rice grains that was comparably more efficient than that by 0.05% ZVI (decrease of 15.8% Sb accumulation) or 0.095% BC (decrease of 12.7% Sb accumulation) alone, demonstrating the synergistic effect of ZVI and BC on mitigating Sb uptake by rice plants. ZVI presence resulted in the formation of iron oxides in the soil and on root surfaces, and the S2−/S22− ascent also increased by 58.7% on day 75 compared with that of the control, facilitating the reduction of Sb(V) to less mobile Sb(III), thereby decreasing Sb accumulation in rice plants."

Areti, H., Jabesa, A., Daba, B., Process, D. J.-J. of W., (2024) Response surface method based parametric **optimization of Cr (VI) removal** from tannery wastewater using a mixed banana peel and corn cob activated carbon : Kinetic and isotherm modeling studies. Elsevier. https://www.sciencedirect.com/science/article/pii/S2214714424002095

From the Abstract: "The maximum Cr(VI) removal effectiveness of 98.95 ± 0.375 %, 87.19 ± 0.28 %, and 85.02 ± 0.21 % were found for synthetic solutions, East Africa Tannery PLC and Houdao Chen/Pelle Leather

Production, respectively, at optimal conditions of contact time of 34.40 min, pH 2.05, a biochar dose of 0.354 g, and an initial Cr(VI) concentration of 23.02 mg L−1.”

Bakari, Z., Turki, N., Boujelben, N., … A. E. G.-I. C., (2024) Synthesis of activated biochar derived from Washingtonia robusta palm seeds and evaluation of its viability for **copper and zinc ions removal** from contaminated water. Elsevier. https://www.sciencedirect.com/science/article/pii/S1387700324001989

From the Abstract: “Our investigation into WRAB synthesis reveals optimal experimental conditions, with an impregnation ratio of approximately 3/1 (w/w) for H3PO4 acid-to-WR seeds ratio, coupled with a pyrolysis temperature of 650 °C. Experimental characterization revealed a substantial removal efficiency, with 97 % and 94 % removal of Cu (II) and Zn (II) ions.”

Rohman, G., Aziz, M., Nawaz, A., … M. E.-S. and, (2024) High-Performance Biochar from Chlorella pyrenoidosa algal biomass for **Heavy Metals Removal in Wastewater**. Elsevier. https://www.sciencedirect.com/science/article/pii/S1383586624006099

From the Abstract: “The maximum adsorption capacity of lead (Pb) based on Langmuir model of modified biochar (qmax) is 159.071 ± 23.4008 mg/g. The heterogeneity factor (hf) based on Freundlich model is 0.4671 ± 0.06394, which mainly indicates the physical adsorption. The separation factor (RL) is nearly zero, indicating irreversible nature. The pseudo second order kinetic model showed that the rate of adsorption (k2) for modified biochar is 0.00931 ± 0.00222 g.mg−1 min−1.”

Sun, H., Jin, J., Sun, Y., Zuo, F., Feng, R., & Wang, F. (2024). Preparation of microbial agent immobilized composites for **Cr(VI) removal** from wastewater. Environmental Technology, 1–13. https://doi.org/10.1080/09593330.2024.2323030

From the Abstract: “The optimal preparation conditions were the fraction of magnetic PVA was 5.00%, the fraction of SA was 4.00%, the fraction of CaCl2 was 4.00%, and the calcification time was 12 h. The experimental results indicated that PVA/SA/AC agents accelerated the reduction rate of Cr(VI). The

removal rate of Cr(VI) by immobilized cells (90.5%) under ideal conditions was substantially higher than that of free cells (11.0%).”

Wilson, K., Iqbal, J., … A. O. A. O. H.-A., (2024) Camel Dung-Derived Biochar for the **Removal of Copper (II) and Chromium (III) Ions** from Aqueous Solutions: Adsorption and Kinetics Studies. ACS Publications. https://pubs.acs.org/doi/abs/10.1021/acsomega.3c08230

From the Abstract: “The research revealed that camel dung-derived biochar exhibits exceptional potential for the removal of copper(II) and chromium(III) ions, with removal efficiencies of more than 90% and adsorption capacities of 23.20 and 23.36 mg/g, respectively.”

Yao, S., Zhang, A., Liu, Z., Li, Y., Fu, Y., Interfaces, W. C.-S. and, (2024) Biomass-assisted synthesis of long-rod TiO2 with oxygen vacancies active sites and biomass carbon for efficient photocatalytic **reduction of Cr (VI)** under visible light. Elsevier. https://www.sciencedirect.com/science/article/pii/S2468023024002694

From the Abstract: “exceptional efficiency in Cr(VI) reduction, achieving nearly complete removal (approaching 100 %) within a mere 5-minute duration under visible light irradiation. The strategic integration of surface oxygen vacancies and biochar onto TiO2 notably broadened the absorption spectrum, effectively harnessing sunlight.”

Yu, P., Zhuang, R., Liu, H., Wang, Z., Zhang, C., Wang, Q., … Huang, W. (2024). Recycling alkali lignin-derived biochar with **adsorbed cadmium** into cost-effective CdS/C photocatalyst for methylene blue removal. Waste Management & Research: The Journal for a Sustainable Circular Economy. https://doi.org/10.1177/0734242X241231394

From the Abstract: “The optimal ALB400 demonstrates a high adsorption capacity of 576.0 mg g−1 for Cd removal. Then the converted CdS/C composite shows an efficient MB removal efficiency of 94%. The photodegradation mechanism is mainly attributed to carbon components in the CdS/C composite as electron acceptor promoting the separation of photoelectrons/holes and slowing down the abrasion of CdS particles."

Zhang, Y., Xiao, Q., Wu, W., Zhang, X., … X. X.-S. of T. T., (2024) Comparison of water-soluble organic matter (WSOM)-containing and WSOM-free biochars for simultaneous **sorption of lead and cadmium**. Elsevier. https://www.sciencedirect.com/science/article/pii/S0048969724012981

Zhao, L., Li, C., Li, H., Shu, Z., Luo, Y., Yang, H., (2024) Efficient **Cr (VI) removal by pyrite/porous biochar**: Critical role of potassium salt and sulphur. Elsevier. https://www.sciencedirect.com/science/article/pii/S0269749124003555

Viotti, P., Marzeddu, S., Antonucci, A., Materials, M. D.-, (2024) Biochar as Alternative Material for **Heavy Metal Adsorption** from Groundwaters: Lab-Scale (Column) Experiment Review. Mdpi.Com. https://www.mdpi.com/1996-1944/17/4/809

Xiong, Q., Li, Y., Hou, C., Ma, X., Zhou, X., Zuo, X., & Chen, C. (2024). An efficient and simple approach to **remove Cd(II)** in aqueous solution by using rice straw biochar: performance and mechanisms. Environmental Science and Pollution Research. https://doi.org/10.1007/S11356-024-32222-3

From the Abstract: "The results showed that RS-Biochar prepared at 600 °C (BioC600) has high specific surface area (232.6 m2/g) and shows high Cd(II) removal rate of 91.23% with the maximum Cd(II) adsorption capacity of 8.62 mg/g. The Langmuir model fit well to describe the adsorption process of Cd(II) on the BioC600."

Yoon, K., Kwon, G., Kim, E., Rinklebe, J., Engineering, H. S.-C., (2024) Production of Fe-biochar from paper-mill sludge and its application to **Se (VI) and Se (IV) removal**. Elsevier. https://www.sciencedirect.com/science/article/pii/S1385894724009550

From the Abstract: "Se(VI) was adsorbed mainly on the Fe phases while Se(IV) was adsorbed on both Fe phases and carbon surface by specific binding mechanisms, with those adsorbed on Fe phases being subsequently reduced to Se0."

Zeng, Y., Lin, Y., Ma, M., & Chen, H. (2024). **Adsorption effect and mechanism of Cd (II)** by different phosphorus-enriched biochars. Environmental Science and Pollution Research. https://doi.org/10.1007/S11356-024-32308-Y

From the Abstract: "The adsorption of Cd(II) by PBC involved ion exchange, mineral precipitation, complexation with oxygen-containing functional groups (OFGs), cation-π interaction, electrostatic interaction, and physical adsorption. Ion exchange was identified as the primary adsorption mechanism for Cd(II) by BC and FBC (51.53% and 53.15% respectively), while mineral precipitation played a major role in the adsorption of Cd(II) by CBC and MBC (51.10% and 47.98% respectively)."

Zhao, Zhiqiang, Chen, J., Gao, S., Lu, T., Li, L., Farooq, U., … Qi, Z. (2024). Low-molecular-weight aromatic acids mediated the **adsorption of Cd2+ onto biochars**: effects and mechanisms. Environmental Science and Pollution Research. https://doi.org/10.1007/S11356-024-32253-W

From the Abstract: "the adsorption ability of biochars for Cd2+ improved with the increase of pyrolysis temperature, which was ascribed to the increased inorganic element contents (e.g., P, S, and Si) and aromaticity, increasing the complexation between mineral anions and metal ions, and the enhanced cation-π interaction."

Girkar, M., Shukla, S., Bharti, V., Kumar, K., … S. K.-D. and W., (2024) **Removal of fluoride** from groundwater by chemically functionalized sugarcane bagasse biochar and bagasse pellets in a fixed-bed sorption system. Elsevier. https://www.sciencedirect.com/science/article/pii/S1944398624000584

Guo, H., Cheng, S., Xing, B., Meng, M., Feng, L., … Y. N.-A. J. of, (2024) Preparation of three kinds of efficient sludge-derived adsorbents for **metal ions and organic wastewater purification**. Elsevier. https://www.sciencedirect.com/science/article/pii/S187853522400073X

From the Abstract: "The sludge activated carbon is prepared from high-carbon sludge biochar using ZnCl2 as chemical agent in the additive of pine sawdust for MO and CIP removal with adsorption amount of the 754.05 mg/g and 635.62 mg/g, respectively. Mg-Al LDO is prepared from the leaching solution of the high-ash sludge bicohar, which can quickly remove Pb2+ from wastewater with adsorption amount of 147.89 mg/g. Mg-Al LDO has good reusability after three cycles."

Hu, S., Liu, C., Bu, H., Chen, M., Tang, J., Jiang, B., & Ran, Y. (2024). Reduced sulfur compounds and carboxylic acid groups in dissolved PFRs of iron-biochar **enhance Cr (VI) reduction** in anaerobic conditions. Biochar, 6(1), 13. https://doi.org/10.1007/S42773-024-00305-6

Olupot, P., Wakatuntu, J., Turyasingura, M., … J. J.-R. in, (2024) Optimization of **heavy metal removal** by activated carbon obtained as a co-product from fast pyrolysis of rice husks. Elsevier. https://www.sciencedirect.com/science/article/pii/S2590048X24000190

From the Abstract: "Optimum treatment parameters were: adsorbent dose (11.90 g/L), contact time (172.5 min), temperature (54 °C) with removal efficiencies of 98.2%, 84.1%, 75.3%, 98.1%, 75.7% for Cu2+, Co2+, Zn2+, Pb2+, and Ni2+, respectively."

Song, Z, Liu, Y., Liu, L., Yang, C., Tian, W., Duan, B., (2024) Reusable magnetically-modified Enteromorpha prolifera-based biochar hydrogels: competitive removal mechanism for **metal-organic dye composite**. Springer. https://link.springer.com/article/10.1007/s44246-023-00098-6

From the Abstract: "MO and Cr (VI) adsorption decreased from 74.88% to 47.65% and from 62.33% to 42.4%, respectively. Competition between MO and Cr (VI) in the dual system can be attributed to the presence of amino and hydroxyl groups... Additionally, MM-EBC-HD nanocomposites presented a recovery rate of 87% after 5 cycles and thus could be used to avoid adsorbents-caused environmental hazards."

Syarifuddin, S., Heryanto, H., Suryani, S., Water, D. T.-D. and, (2024) Biochar from Diverse Wastes: A Comprehensive Bibliometric Analysis of **Heavy metal Adsorption in Wastewater**. Elsevier. https://www.sciencedirect.com/science/article/pii/S1944398624001103

Treatment, Y. Y.-D. and W., (2024) Remediation of **Cd (II) contamination** in aqueous solution by modified sludge biochar with molten salt-assisted pyrolysis. Elsevier. https://www.sciencedirect.com/science/article/pii/S1944398624000626

From the Abstract: "Additionally, the maximum adsorption capacities of Cd(II) by VSBC and MSBC were 39.02 and 101.26 mg/g at pH 5.0 and 25 °C, respectively. The mechanisms of Cd(II) removal included complexation of O-containing groups, ion exchange, precipitation, and electrostatic interaction. After three adsorption-desorption experiments, the Cd(II) removal efficiency by VSBC was maintained at 33.26%, while the Cd(II) removal efficiency on MSBC was maintained at 90.18%."

Zhang, N., Reguyal, F., Pollution, A. S.-E., (2024) Effect of iron nanoparticles on **chromium adsorption** in aqueous solution using magnetic biochar: A site energy distribution analysis. Elsevier. https://www.sciencedirect.com/science/article/pii/S0269749124003075

From the Abstract: "the maximum adsorption capacity increased from 2.47 mg/g (EWTWB) to 9.11 mg/g (GSMB4). The highest saturation magnetization was achieved at 13.4 Am2/kg at GSMB4. Similarly, surface areas rose up to 72.9 m2/g at GSMB3 but declined thereafter due to GSMFe aggregation and pore blockage."

Collivignarelli, M., Illankoon, W., Water, C. M.-, (2024) Preparation and Modification of Biochar Derived from Agricultural Waste for **Metal Adsorption** from Urban Wastewater. Mdpi.Com. https://www.mdpi.com/2073-4441/16/5/698

From the Abstract: "The results show that the as-prepared RHB can remove the metals, even if in low amounts (Fe (48%), Mn (3%), and Se (39%))."

Ye, P., Qin, L., He, M., Wu, F., Chen, Z., Liang, M., & Deng, L. (2024). Potential of Zero Charge-Mediated Electrochemical **Capture of Cadmium Ions** from Wastewater by Lotus Leaf-Derived Porous Carbons. Acta Physico Chimica Sinica, 0(0), 2311032. https://doi.org/10.3866/PKU.WHXB202311032

Zuo, J., Ren, J., Jiang, L., Tan, C., Li, J., Xia, Z., (2024) Preparation of PVA/SA-FMB Microspheres and Their **Adsorption of Cr (VI)** in Aqueous Solution. Mdpi.Com. https://www.mdpi.com/2227-9717/12/3/443

From the Abstract: "Adsorption trials revealed that at a temperature of 25 °C and a pH of 2, the adsorption capacity of PVA/SA-FMB for Cr(VI) was 13.7 mg/g within the initial 30 min, reaching an equilibrium capacity of 26.03 mg/g after 1440 min. Notably, the material sustained a Cr(VI) removal efficiency exceeding 90% across five cycles, underscoring its rapid and effective Cr(VI) eradication performance."

Puari, A., Azora, A., Rusnam, R., Yanti, N., … F. A.-C. S. in, (2024) Carbonization parameters optimization for the **biosorption capacity of Cu2+** by a novel biosorbent from agroindustrial solid waste using response surface methodology. Elsevier. https://www.sciencedirect.com/science/article/pii/S2666016424000392

From the Abstract: "The optimized carbonization conditions obtained are at 575.42 °C, 2.59 hours, and a gradient of 19.52 °C/min, yielding a maximum predicted biosorption capacity of 6.62 mg/g. Experimental values for Cu2+ removal rate and adsorption capacity confirm the model's accuracy, with a 2% deviation from predictions."

Tan, Y., Wang, J., Zhan, L., Yang, H., Reports, Y. G.-S., (2024) Removal of **Cr (VI)** from aqueous solution using ball mill modified biochar: multivariate modeling, optimization and experimental study. Nature.Com. https://www.nature.com/articles/s41598-024-55520-9

From the Abstract: "After ball milling, the adsorption capacity of Cr(VI) increased by 3.5–9.1 times, and the adsorption capacity reached 52.21 mg/g."

Urgel, J. J. D. T., Briones, J. M. A., Diaz, E. B., Dimaculangan, K. M. N., Rangel, K. L., & Lopez, E. C. R. (2024). Removal of **diesel oil** from water using biochar derived from waste banana peels as adsorbent. Carbon Research, 3(1). https://doi.org/10.1007/S44246-024-00100-9

From the Abstract: "Adsorption parameters were correlated using a reduced cubic model, and an adsorbent dose of 2.50 g, pH of 7.00, salinity of 44,999.95 mg/L, and contact duration of 240 minutes were found to be optimal, producing a sorption capacity of 5.3352 g diesel oil/g adsorbent."