

Table S1: Literature used in meta-analysis.

| | Year | Title | DOI |
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| 1 | 2017 | Short-term effects of biochar on grapevine fine root dynamics and arbuscular mycorrhizae production | 10.1016/j.agee.2017.01.025 |
| 2 | 2017 | Root traits and nitrogen fertilizer recovery efficiency of corn grown in biochar-amended soil under greenhouse conditions | 10.1007/s11104-017-3180-6 |
| 3 | 2014 | Biochar Improves Sugarcane Seedling Root and Soil Properties Under a Pot Experiment | 10.1007/s12355-014-0335-0 |
| 4 | 2020 | Biochar increases maize yield by promoting root growth in the rainfed region | 10.1080/03650340.2020.1796981 |
| 5 | 2016 | Biochars reduce infection rates of the root-lesion nematode <i>Pratylenchus penetrans</i> and associated biomass loss in carrot | 10.1016/j.soilbio.2015.12.003 |
| 6 | 2015 | Changes in soil nutrient availability explain biochar's impact on wheat root development | 10.1007/s11104-015-2700-5 |
| 7 | 2017 | Growth and metabolic responses of maize roots to straw biochar application at different rate | 10.1007/s11104-017-3229-6 |
| 8 | 2016 | Root development of non-accumulating and hyperaccumulating plants in metal-contaminated soils amended with biochar | 10.1016/j.chemosphere.2015.03.068 |
| 9 | 2018 | Effects of bamboo biochar on soybean root nodulation in multi-elements contaminated soils | 10.1016/j.ecoenv.2017.12.036 |
| 10 | 2020 | Impact of biochar on plant growth and uptake of ciprofloxacin, triclocarban and triclosan from biosolids | 10.1080/03601234.2020.1807264 |
| 11 | 2020 | Growth and elemental uptake of <i>Trifolium repens</i> in response to biochar addition, arbuscular mycorrhizal fungi and phosphorus fertilizer applications in low-Cd-polluted soils | 10.1016/j.envpol.2019.113761 |
| 12 | 2020 | Enhancing Cadmium Tolerance and Pea Plant Health through <i>Enterobacter</i> sp. MN17 Inoculation Together with Biochar and Gravel Sand | 10.3390/plants9040530 |
| 13 | 2020 | Biochar Improves the Growth Performance of Maize Seedling in Response to Antimony Stress | 10.1007/s11270-020-04521-1 |
| 14 | 2020 | Biochar bound urea boosts plant growth and reduces nitrogen leaching | 10.1016/j.scitotenv.2019.134424 |
| 15 | 2019 | Phosphate Uptake is Correlated with the | 10.3390/agronomy9120824 |

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| | | Root Length of Celery Plants Following the Association between Arbuscular Mycorrhizal Fungi, <i>Pseudomonas</i> sp. and Biochar with Different Phosphate Fertilization Levels | |
| 16 | 2018 | Biochar enhancement of facilitation effects in agroforestry: early growth and physiological responses in a maize-leucaena model system | 10.1007/s10457-018-0336-1 |
| 17 | 2019 | Application of wood biochar in polluted soils stabilized the toxic metals and enhanced wheat (<i>Triticum aestivum</i>) growth and soil enzymatic activity | 10.1016/j.ecoenv.2019.109635 |
| 18 | 2019 | Effects of biochar on the growth of apple seedlings, soil enzyme activities and fungal communities in replant disease soil | 10.1016/j.scienta.2019.108641 |
| 19 | 2019 | Straw and biochar effects on soil properties and tomato seedling growth under different moisture levels | 10.1080/03650340.2019.1575510 |
| 20 | 2019 | Biochar Effects on Soil Properties and Wheat Biomass vary with Fertility Management | 10.3390/agronomy9100623 |
| 21 | 2020 | Amending Sandy Soil with Biochar Promotes Plant Growth and Root Colonization by Mycorrhizal Fungi in Highbush Blueberry | 10.21273/hortsci14542-19 |
| 22 | 2020 | Combined biochar and nitrogen application stimulates enzyme activity and root plasticity | 10.1016/j.scitotenv.2020.139393 |
| 23 | 2020 | Effect of biochar on yield and quality of tomato grown on a metal-contaminated soil | 10.1016/j.scienta.2020.109210 |
| 24 | 2015 | Biochar stimulates plant growth but not fruit yield of processing tomato in a fertile soil | 10.1016/j.agee.2015.04.015 |
| 25 | 2019 | Effects of biochar on growth, and heavy metals accumulation of moso bamboo (<i>Phyllostachy pubescens</i>), soil physical properties, and heavy metals solubility in soil | 10.1016/j.chemosphere.2018.11.159 |
| 26 | 2020 | Change in composition and function of microbial communities in an acid bamboo (<i>Phyllostachys praecox</i>) plantation soil with the addition of three different biochars | 10.1016/j.foreco.2020.118336 |
| 27 | 2020 | Application of co-composted farm manure and biochar increased the wheat growth and | 10.1016/j.chemosphere.2019.125809 |

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| | | decreased cadmium accumulation in plants under different water regimes | |
| 28 | 2019 | The effects of biochar and dredged sediments on soil structure and fertility promote the growth, photosynthetic and rhizosphere microbial diversity of <i>Phragmites communis</i> (Cav.) Trin. ex Steud | 10.1016/j.scitotenv.2019.134073 |
| 29 | 2020 | Incorporation of biochar and nanomaterials to assist remediation of heavy metals in soil using plant species | 10.1016/j.eti.2020.101134 |
| 30 | 2020 | Biochar-assisted transformation of engineered-cerium oxide nanoparticles: Effect on wheat growth, photosynthetic traits and cerium accumulation | 10.1016/j.ecoenv.2019.109845 |
| 31 | 2020 | Influences of arbuscular mycorrhizae, phosphorus fertiliser and biochar on alfalfa growth, nutrient status and cadmium uptake | 10.1016/j.ecoenv.2020.110537 |
| 32 | 2018 | Effects of rice-husk biochar on sand-based rootzone amendment and creeping bentgrass growth | 10.1016/j.ufug.2018.09.001 |
| 33 | 2018 | Impact of biochar on soil characteristics and temporal greenhouse gas emissions: A field study from southern Canada | 10.1016/j.biombioe.2018.08.019 |
| 34 | 2019 | Biochar effect associated with compost and iron to promote Pb and As soil stabilization and <i>Salix viminalis</i> L. growth | 10.1016/j.chemosphere.2019.01.188 |
| 35 | 2019 | Interactive effects of biochar and AMF on plant growth and greenhouse gas emissions from wetland microcosms | 10.1016/j.geoderma.2019.03.033 |
| 36 | 2020 | Effect of biochar and redmud amendment combinations on <i>Salix triandra</i> growth, metal(loid) accumulation and oxidative stress response | 10.1016/j.ecoenv.2020.110466 |
| 37 | 2019 | Biochars effects potentially toxic elements and antioxidant enzymes in <i>Lactuca sativa</i> L. grown in multi-metals contaminated soil | 10.1016/j.eti.2019.100427 |
| 38 | 2019 | Biochar and crushed straw additions affect cadmium absorption in cassava-peanut intercropping system | 10.1016/j.ecoenv.2018.10.003 |
| 39 | 2014 | Soil application of biochar produced from biomass grown on trace element contaminated land | 10.1016/j.jenvman.2014.07.046 |
| 40 | 2016 | Effects of gasification biochar on plant-available water capacity and plant growth in | 10.1016/j.still.2016.03.002 |

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| | | two contrasting soil types | |
| 41 | 2015 | Impact of quality and quantity of biochar and hydrochar on soil Collembola and growth of spring wheat | 10.1016/j.soilbio.2015.01.014 |
| 42 | 2017 | Potential of miscanthus biochar to improve sandy soil health, in situ nickel immobilization in soil and nutritional quality of spinach | 10.1016/j.chemosphere.2017.07.097 |
| 43 | 2015 | Biochar increases arbuscular mycorrhizal plant growth enhancement and ameliorates salinity stress | 10.1016/j.apsoil.2015.07.014 |
| 44 | 2015 | Biochar stimulates plant growth but not fruit yield of processing tomato in a fertile soil | 10.1016/j.agee.2015.04.015 |
| 45 | 2014 | Biochar makes green roof substrates lighter and improves water supply to plants | 10.1016/j.ecoleng.2014.06.017 |
| 46 | 2016 | Modest amendment of sewage sludge biochar to reduce the accumulation of cadmium into rice(<i>Oryza sativa</i> L.): A field study | 10.1016/j.envpol.2016.06.053 |
| 47 | 2014 | Biochar and humic acid amendments improve the quality of composted green waste as a growth medium for the ornamental plant <i>Calathea insignis</i> | 10.1016/j.scienta.2014.06.021 |