

## DAFTAR PUSTAKA

- Adi, F. 2019. Permintaan Edamame 75 Ribu Ton, Indonesia Baru Sanggup 5 Ribu Ton. <https://jatimnet.com/permintaan-Edamame-75-ribu-ton-indonesia-baru-sanggup-5-ribu-ton>. Diakses 07 Juli 2019.
- Adie, M. M., & A. Krisnawati. 2013. Biologi tanaman kedelai. *In* Sumarno, Suyamto, A. Widjono, Hermanto, & H. Kasim. Pusat Penelitian dan Pengembangan Tanaman Pangan, Malang. 45-73.
- Ahmad, M., A. U. Rajapaksha, J. E. Lim, M. Zhang, N. Bolan, D. Mohan, M. Vithanage, S. S. Lee, & Y. S. Ok. 2014. Biochar as a sorbent for contaminat management in soil and water: A review. *Chemosphere*. 99:19-33.
- Anggria, L., A. Kasno, dan I. A. Sipahutar. 2013. Fosforus balance on broccoli yield planted on highly upland area. *In*: Widowati, L. R., Sukristiyonubowo, I. A. Sipahutar, A. Kasno, J. Purnomo, A. Asgar (Eds). Prosiding Seminar Nasional Peninngkatan Produktivitas Sayuran Dataran Tinggi. Balai Besar Litbang Sumber Daya Lahan Pertanian. 211-217.
- Asadi, 2009. Karakteristik plasma nutfah untuk perbaikan varietas kedelai sayur (Edamame). *Buletin Plasma Nutfah*. 15: 59-69.
- Bakshi, S., C. Banik, and D. A. Laird. 2020. Estimating the organnic oxygen content of biochar. *Scientific Reports*. 20:1-12.
- Balai Penelitian Tanah. 2009. Analisis Kimis Tanah, Tanaman, Air, dan Pupuk. Balai Penelitian Tanah. Bogor. 234 p.
- Bappeda Kab. Magelang. 2020. Rencana Kerja Pemerintah Daerah Kabupaten Magelang Tahun 2020. <https://bappeda.magelangkab.go.id/download/subfolder/582#>. Diakses 23 mei 2021.
- Barrow, N. J. 2017. The effect oh pH on fosfat uptake from the soil. *Plant and Soil*. 410: 401-410.
- Ben-Dor, E., & A. Banin. 1989. Determinatioin of organic matter content in arid-zone soil using a sample "loss-on-ignition" method. *Communications in Soil Science and Plant Analysis*. 20: 15-16.
- Bird, M. I., J. G. Wynn, G. Saiz, C. M. Wurster, and A. McBeath. 2015. The pyrogenic caarbon cycle. *Annual Review of Earth and Planetary Sciences*. 43:9.1-9.26.
- Bird, M., C. Keitel, & W. Meredith. 2017. Analysis of biochar for C, H, N, O, dan S by elemental analyser. *In*: Singh, B., M. Camps-Arbestain, & J. Lehmann. Biochar: a guide to analysis method. CRC Press. Boca Raton. 39-50.
- Blackwell, P., S. Shea, P. Storer, Z. Solaiman, M. Kerkmans, and I. Stanley. 2007. Improving wheat production with deep banded oil malee charcoal in Western

Australia. International Agchar Initiative Conference Terrigal New South Wales. 29 April-2 May 2007. 1-24.

- Boehm, H. P . 1994. Some aspect of the surface chemistry of carbon blacks and other carbons. *Carbon*. 32: 759-769.
- BPS Kab. Magelang. 2021. Kabupaten Magelang dalam Angka 2021. BPS Kabupaten Magelang. Magelang.p 549.
- [BSN] Badan Standarisasi Nasional. 1992. *SN/ 01-2891-1992*. Cara Uji Makanan dan Minuman. Badan Standarisasi Nasional. Jakarta.
- Bulle, M., R. Kishorekumar, P. K. Pathak, A. Wany., and K. J. Gupta. 2020. Measurement of nitrate reductase activity in tomato (*Solanum lycopersicum L.*) leaves under different condition. In: Gupta, K. J. *Nitrogen Metabolism in Plants*. Humana. New York.p27-36.
- Campbell, W. H. 1999. Nitrate reductase structure, function and regulation: bridging the gap between biochemistry and physiology. *Annual Review of Plant Physiology and Plant Molecular biology*. 50: 277-303.
- Camps-Arbestain, M., J. E. Amonette, B. Singh, T. Wang, and H. P. Schmidt. 2017. A biochar Classification system and associated test methods. *In: Lehmann, J., & S. Joseph. Biochar for Environmental Management: Science and Technology*. Earthscan, London. p.165-194.
- Chaundary, M. I., J. J. Adu-Gyamfi. H. Saneko, N. G. Nguyen, R. Suwa, S. Kanai, H. A. El-Shemy. D. A. Lightfoot, and K. Fujita. 2008. The effect of fosforus deficiency on nutrient uptake, nitrogen fixation and photosynthetic rate in mashbean, mungbean, and soybean. *Acta Physiol Plant*. 30:537-544.
- Chen, B., D. Zhou, and L. Zhu. 2008. Transitional adsorption and partition of nonpolar dan polar aromatic contaminants by biochar of pine needles with different pyrolytic temperatures. *Environ. Sci. Technol*. 42:5137-5143.
- Chen, L. Q. Chen, P. Rao, L. Yan, A. Shakib, & G. Shen. 2018. Formulating and optimizing a novel biochar based fertilizer for simultaneous slow-release of nitrogen and immobilization of cadmium. *Sustainability*. 10: 1-14.
- Chia, C. H., A. Downie, and P. Munroe. 2017. Characteristics of biochar: physical and structural properties. *In: Lehmann, J., & S. Joseph. Biochar for Environmental Management: Science and Technology*. Earthscan, London. p.89-109.
- Chun, Y., G. Sheng, C. T. Chiou, & B. Xing. 2004. Compositions and sorptive properties of crop residue-derived chars. *Environmental Science & Technology*. 38:4649-4655.
- Clara, L., R. Fatma, A. Viridiana, and W. Lieal. 2017. Soil Carbon Organic The Hidden Potential. Food and Agriculture Organization of The United Nations. Rome. 77p.
- Cottenie, A. 1989. Soil and Plant Testing as A Basis of Fertilizer Recommendations. Food and Agriculture Organization of The United Nations. Rome. 118 p.

- Dahlgren, H., S. Shoji, & M. Nanzyo. 1993. Mineralogical characteristics of volcanic ash soils. *In*: S. Shoji, M. Nanzyo, & R. Dahlgren (Eds). *Volcanic Ash Soils : Genesis, Properties, and Utilization*. Elsevier Science Publishers B. V. Amsterdam. 101-136 p.
- Ding, Y., L. Yu-Xue, W. Wei-Xiang, S. De-Zhi, Y. Min, and Zhe-Ke, Z. 2010. Evaluation of biochar effect on nitrogen retention and leaching in multi-layered soil columns. *Water Air Soil Pollut.* 213: 47-55.
- Ding, Y. Y. Liu, S. Liu, Z. Li., X. Tan, X. Huang, G. Zeng. L. Zhou, and B. Zheng. 2016. Biochar to improve soil fertility. A review. *Agronomy for Sustainable Development*. 36: 1-18.
- El Sharkawi, H.M., S. Tojo., T. Chosa., F.M. Malhat., & A. M. Youssef. 2018. Biochar-ammonium fosfat as an uncoated-slow release fertilizer in sandy soil. *Biomass and Bioenergy* 117: 154-160.
- Enders, A., S. Sohi, J. Lehmann, & B. Singh. 2017. Total element analysis of metals and nutrient in biochar. *In*: Singh, B., M. Camps-Arbestain, & J. Lehmann. *Biochar: a guide to analysis method*. CRC Press. Boca Raton. 95-108.
- Fernandez-Escobar, R., M. Benlloch, E. Herrera, & J. M. Garcia-Novelo. 2004. Effect of traditional and slow-release N fertilizer on growth of olive nursery plants and N losses by leaching. *Scientia Horticulture* 101:39-49.
- Gao, T., M. Gao, J. Peng, N. Li. 2018. Effect of different amount of biochar on nitrogen, fosforus and potassium nutrient in soil. *IOP Conf. Series: Materials Science and Engineering*. 394:1-7.
- Gentili, R., R. Ambrosini, C. Montagnanni, S. Caronni, and S. Citterio. 2018. Effect of soil pH on the growth, reproductive investment and pollen allergenicity of *Ambrosia artemisiifolia* L. *Frontiers in Plant Science*. 9:1-12.
- Ghezzehei, T. A., D. V. Sarkhot, & A. A. Berhe. 2014. Biochar can be used to capture essential nutrients from dairy wastewater and improve soil physicochemical properties. *Solid Earth*. 5: 953-962.
- Glaser, B. & V-I. Lehr. 2019. Biochar effects on fosforus availability in agricultural soils: a meta-analysis. 9: 1-9.
- Graham, P. H., & J. C. Rosas. 1979. Fosforus Fertilization and symbiotic nitrogen fixation in common bean. *Agronomy Journal*. 71:925-926.
- Gwenzi, W., T. J. Nyambishi, N. Chaukura., & N. Mapope. 2017. Synthesis and nutrient release patterns of a biochar-based N-P-K slow-release fertilizer. *Int. J. Environ. Sci. Technol.* 1-10.
- Halford, I. C. R. 1997. Soil fosforus: its measurement, and its uptake by plants. *Australian Journal of Soil Research*. 35:223-239.
- Han, X., S. Chen, & X. Hu. 2009. Controlled-release fertilizer encapsulated by starch/polyvinyl alcohol coating. *Desalination*. 240:21-26.

- Hartiko, H. 1982. Leaf and Root Nitrate Reductase Activities of Coconut (*Coconut nucifera* L.) Cultivars and Hybrids. Disertatioin. Los Banos: University of the Phillipines.
- Haryati, U., T. Budiarti, dan A. D. Makalew. 2013. Konservasi lansekap pertanian lahan kering berbasis sayuran mendukung pengembangan agrowisata di dataran tinggi Merbabu. *In*: Widowati, L. R., Sukristiyonubowo, I. A. Sipahutar, A. Kasno, J. Purnomo, A. Asgar (Eds). Prosiding Seminar Nasional Peninngkatan Produktivitas Sayuran Dataran Tinggi. Balai Besar Litbang Sumber Daya Lahan Pertanian.60-87.
- Hidayanto, F., B. H. Purwanto, dan S. N. H. Utami. 2020. Relationship between allophaneae with labile carbon and nitrogen fractions of soil in organic and conventional vegetable farming systems. *Polish Journal of Soil Science*. 53: 273-291.
- Hua, L., W. Wu, Y. Liu, M. B. McBride, & Y. Chen. 2009. Reduction of nitrogen loss and cu and zn mobility during sludge composting with bamboo charcoal amendment. *Environ Sci Pollut Ress*. 16:1-9.
- Huang, A., Z. Huang, Y. Dong, L. Chen, L. Fu, L. Li, & L. Ma. 2013. Controlled release of phoxim from organobentonite based formulation. *Applied Clay Science*. 80-81: 63-68.
- Hue, N. V., and I. Amien. 1989. Aluminum detoxification with green manures. *Communication in Soil Science and Plant Analysis*. 20:1499-1511.
- Hue, N. V. 1991. Effect of organic acids/anions on P sorption and phytoavailability in soils with different mineralogies. *Soil Science*. 152:463-471.
- Husk, B and J. Major. 2010. Commercial scale agricultural biochar field trial in Québec, Canada, over two years: Effects of biochar on soil fertility, biology, crop productivity and quality. BlueLeafInc., Drummondville, Quebec.
- Jien, S.-H., and C.-H. Wang. 2013. Effect of biochar on soil properrties and erosion potential in a highly weathered soil. *Catena*. 110:225-233.
- Johnson, D., S. Wang, and A. Suzuki. 1999. Edamame: a vegetable soybean for colorado. *In*: J. Jules. Perspectives on New Crops and New Uses (Eds).p 385-387.
- Jones, D. L. 1998. Organic acids in the rhizosphere-a critical review. *Plant and Soil*. 205: 25-44.
- Joseph, S. C. I. Kammann., J. G. Shepherd., P. Conte., H. P. Schmidt., N. Hageman., A. M. Rich., C. E. Marjo., J. Allan., P. Munroe., D. R. G. Mitchell., S. Donne., K. Spokas., & E. R. Graber. 2017. Microstructural and associated chemical changes during the composting of high-temperature biochar: Mechanisms for nitrate, fosfat and other nutrient retention and release. *Science of the Total Environment*. 1-14.
- Joseph, S. D., & C. T. Johnston. 2017. Application of scanning electron microscopy to the analysis of biochar-related materials. *In*: Singh, B., M. Camps-Arbestain, & J. Lehmann. Biochar: a guide to analysis method. CRC Press. Boca Raton. 272-282.

- Kameyama, K. T. Miyamoto, T. Shiono, and Y. Shinogi. 2012. Influence of sugarcane bagasse-derived biochar application on nitrate leaching in calcareous dark red soil. *Journal of Environment Quality*. 41:1131-1137.
- Kuo, Y. C. Lee, & S Jien. 2020. Reduction of nutrient leaching potential in coarse-textured soil by using biochar. *Water*. 12:1-15.
- Kasno, A., I. A. Sipahutar, dan A. Rachman. 2013. Pengelolaan hara tanah dan peningkatan pendapatan petani dalam pola tanaman sayuran dataran tinggi di Kopeng dan Buntu. *In: Widowati, L. R., Sukristiyonubowo, I. A. Sipahutar, A. Kasno, J. Purnomo, A. Asgar (Eds). Prosiding Seminar Nasional Peningkatan Produktivitas Sayuran Dataran Tinggi. Balai Besar Litbang Sumber Daya Lahan Pertanian*.193-200.
- LeBeau, J. M., & Y. Boonyongmaneerat. 2007. Comparison study of aqueous binder systems for slurry-based processing. *Materials Science and Engineering*. 458:17-24
- Lehmann, J. D. Kern, L. German, J. McCann, G. C. Martins, and A. Moreira. 2003. Soil fertility and production potential. *In: Lehmann, J., D. C. Kern, B. Glaser, and W. I. Woods (Eds). Amazonia Dark Earth Origin Properties Management. Kluwer Academic Publisher. Netherland*.p105-124.
- Lehmann, J. 2007. Bio-energy in the black. *Frontiers in Ecology and the Environment*. 5: 381-387.
- Lehmann, J., & S. Joseph. 2009. Biochar for Environmental Management: An Introduction. *In: Lehmann, J., & S. Joseph. Biochar for Environmental Management: Science and Technology. Earthscan, London*. p.1-12.
- Li, H., Y. Li, Y. Xu, & X. Lu. 2019. Biochar fosforus fertilizer effects on soil fosforus availability. *Chemosphere*. 1-20.
- Li, S-X, Z-H. Wang, and B. A. Stewart. 2013. Responses of crop plants to ammonium and nitrate N. *Advances in Agronomy*. 118: 205-397.
- Liang, B., J. Lehmann, D. Solomon, J. Kinyangi, J. Grossman, B. O'Neill, J. O. Skjemstad, J. Thies, F. J. Luizao, J. Petersen, and E. G. Neves. 2006. Black Carbon increase cation exchange capacity in soils. *Soil Science Society of America Journal*. 70:1719-1730
- Liu, X., M. Zheng, Y. Xiao, Y. Yang, L. Yang, Y. Liu, B. Lei, H. Dong, H. Zhang, and H. Fu. 2013. Microtube bundle carbon derived from paulownia sawdust for hybrid supercapacitor electrodes. *Applied Materials and Interfaces*. 5: 4667-4677.
- Liu, X., J. Liao., H. Song., Y. Yang., C. Guan., & Z. Zhang. 2019. A biochar-based route for environmentally friendly controlled release of nitrogen: urea-loaded biochar and bentonite composite. *Scientific Report*. 9 (9548): 1-12.
- Lott, J. N. A., I. Ockenden, V. Raboy, and G. D. Batten. 2000. Phytic acid and fosforus in crop seeds and fruits: a global estimate. *Seed Science Research*. 10:11-33.

- Lua, A. C., T. Yang, dan J. Guo. 2004. Effects of pyrolysis conditions on the properties of activated carbons prepared from pistachio-nut shells. *Journal of Analytical and Applied Pyrolysis*. 72:279-287
- Madari, B. E., M. A. S. Silva., M. T. M. Carvalho., A. H. N. Maia, F. A. Petter, J. L. S. Santos, S. M. Tsai, W. G. O. Leal, and W. M. Zeviani. 2017. Properties of a sandy clay loam haplic ferralsol and soybean grain yield in a five-year field trial as affected by biochar amendment. *Geoderma*. 305:100-112.
- Major, J., J. Lehmann, M. Rondon, & C. Goodale. 2010. Fate of soil-applied black carbon: downward migration, leaching and soil respiration. *Global Change Biology*. 16:1366-1379.
- Masclaux-Daubresse, F. Daniel-Vedele, J. Dechorgnat, F. Chardon, L. Gaufichon, and A. Suzuki. 2010. Nitrogen uptake, assimilation and remobilization in plants: challenges for sustainable and productive agriculture. *Annals of Botany*. 105: 1141-1157.
- Mukherjee, A., A. R. Zimmerman, and W. Harris. 2011. Surface chemistry variations among a series of laboratory-produced biochars. *Geoderma*. 163: 247-255.
- Mukherjee, A., and R. Lal. 2014. The biochar dilemma. *Soil Research*. 52:217-230.
- Mullins, G. 2009. Fosforus, Agriculture and The Environment. College of Agriculture and Life Sciences, Virginia Polytechnic Institute and State University. Virginia. p16.
- Nanzyo, M., R. Dahlgren, & S. Shoji. 1993. Chemical characteristics of volcanic ash soils. In: S. Shoji, M. Nanzyo, & R. Dahlgren (Eds). *Volcanic Ash Soils : Genesis, Properties, and Utilization*. Elsevier Science Publishers B. V. Amsterdam. 145-187 p.
- Neall, V. E. 2006. Volcanic Soils. Land Use and Land Cover. *Encyclopedia of Life Support Systems (EOLSS)* 7:1-24.
- Nelson, W. D., & L. E. Sommers. 1996. Total Carbon, Organic Carbon, and Organic Matter. In: D. L. Sparks, A. L. Page, P. A. Helmke, R. H. Loeppert, P. N. Soltanpour, M. A. Tabatabai, C. T. Johnston., & M. E. Sumner. *Methods of Soil Analysis: Part 3 Chemical Method*. Soil Science Society of America, Inc. Madison. 961-1010.
- Pilbeam, D. J. Cakmak, H. Marschner, and E. A. Kirby. 1993. Effect of withdrawal of fosforus on nitrate assimilation and PEP carboxylase activity in tomato. *Plant and Soil*. 153:111-117.
- Purnomo, J. 2013. Pemupukan berimbang pada tanaman cabai pada tanah typic hapludands di Cikembang, Sukabumi. In: Widowati, L. R., Sukristiyonubowo, I. A. Sipahutar, A. Kasno, J. Purnomo, A. Asgar (Eds). *Prosiding Seminar Nasional Peningkatan Produktivitas Sayuran Dataran Tinggi*. Balai Besar Litbang Sumber Daya Lahan Pertanian. 218-228.
- Reza, M. T., J. G. Lynam, V. R. Vasquez, & C. J. Coronella. 2012. Pelletization of biochar from hydrothermally carbonized wood. *Environmental Progress & Sustainable Energy*. 31:225-234.



- Ruffy, T. W. Jr., C. T. MacKown, and D. W. Israel. 1990. Fosforus stress effects on assimilation of nitrate. *Plant Physiology*. 94:328-333.
- Ruffy, T. W. Jr., D. W. Israel, R. J. Volk, J. Qiu, and Tongmin S. A. 1993. Fosfat regulation of nitrate assimilation in soybean. *Journal of Experimental Botany*. 44:879-891.
- Samsu, S. H. 2003. *Membangun Agroindustri Bernuansa Ekspor: Edamame (Vegetable Soybean)*. Graha Ilmu. Yogyakarta.
- Schachtman, D., R. J. Reid, and S. M. Ayling. 1998. Fosforus uptake bu plants: from soil to cell. *Plant Physiol*. 116:447-453.
- Scheerer, U., N. Trube, F. Netzer, H. Rennenberg, and C. Herschbach. 2019. ATP as fosforus and nitrogen source for nutrient uptake by *Fagus sylvatica* and *Populus x canescens* roots. *Frontiers in Plant Science*. 10:1-15.
- Schmidt, H. P., & P. Taylor. 2014. Kon-Tiki flame curtain pyrolysis for the democratization of biochar production. *The Biochar-Journal* 2014. 14 -24.
- Scurlock, J. M. O., D. C. Dayton, and B. Hames. 2000. Bamboo: an overlooked biomass resource?. *Biomass and Energy*. 19: 229-244.
- Sekretariat Kabinet Republik Indonesia. 2014. Kedelai Jember Tembus Pasar International. <https://setkab.go.id/kedelai-jember-tembus-pasar-internasional/>. Diakses 31 Mei 2021.
- Shanmugasundaran, S., S-T. Cheng, M-T. Huang, and M-R. Yan. 1991. Varietal improvement of vegetable soybena in Taiwan. In: S. Shanmugasundaran. *Vegetable Soybean: Research Needs for Production and Quality Improvement*. Kenting, Taiwan 29 April-2 May 1991. 30-42.
- Singh, B. M. M. Dolk., Q. Shen., & M. Camps-Arbestain. 2017. Biochar pH, electrical conductivity and liming potential. In: Singh, B., M. Camps-Arbestain., & J. Lehmann (Eds.). *Biochar : A Guide to Analytical Methods*. CRC Press. Boca Raton. 23-38
- Sipahutar, I. A., L.R. Widowati, dan F. Agus. 2013. Dinamika hara N, P, dan K pada pola tanam sayuran di dataran tinggi Dieng. In: Widowati, L. R., Sukristiyonubowo, I. A. Sipahutar, A. Kasno, J. Purnomo, A. Asgar (Eds). *Prosiding Seminar Nasional Peningkatan Produktivitas Sayuran Dataran Tinggi*. Balai Besar Litbang Sumber Daya Lahan Pertanian. 201-210.
- Soewanto, H, A. Prasongko., & Sumarno. 2013. Agribisnis Edamame untuk Ekspor. In: Sumarno, Suyamto, A. Widjono., Hermanto & H. Kasim (Eds.). *Kedelai: Teknik Produksi dan Pengembangan*. Badan Penelitian dan Pengembangan Pertanian, Bogor. 416-443.
- Soil Survey Staff. 2014. *Keys to Soil Taxonomy*. United States Department of Agriculture, Washington, D.C. 362 p.
- Spokas, K. A. 2015. Review of t he stability of biochar in soil: predictability of O:C molar ratios. 1: 289-303.

- Sugito, T. & T. Shinano. 2013. Estimating fosforus availability in Andisols soil biomass fosforus as an indicator. JARQ 47: 347-351.
- Sukarman & A. Dariah. 2014. Tanah Andisol di Indonesia: Karakteristik, Potensi, Kendala, dan Pengelolaannya untuk Pertanian. Balai Besar Penelitian dan Pengembangan Sumberdaya Lahan Pertanian. Bogor. 144 p.
- Sujitno, E. 2013. Peningkatan produksi tanaman tomat melalui penerapan pupuk majemuk lengkap arga agro A di lahan dataran tinggi. *In*: Widowati, L. R., Sukristiyonubowo, I. A. Sipahutar, A. Kasno, J. Purnomo, A. Asgar (Eds). Prosiding Seminar Nasional Peningkatan Produktivitas Sayuran Dataran Tinggi. Balai Besar Litbang Sumber Daya Lahan Pertanian. 308-314.
- Sultenfuss, J. H., & W. J. Doyle, 1991a. Fosforus Improves Crop Quality. Better Crops With Plant Food 83: 28-29.
- Sultenfuss, J. H., & W. J. Doyle, 1991b. Fosforus Nutrition Improves Plant Disease Resistance. Better Crops With Plant Food 83: 26-27.
- Takahashi, S. 2007. Residual effect of fosforus fertilizer in a low-humic Andisol with low extractable fosforus. Communications in Soil Science and Plant Analysis. 38: 1479-1485.
- Taliman, N. A., Q. Dong, K. Echigo, V. Roboy, and H. Saneoka. 2019. Effect of fosforus fertilization on the growth, photosynthesis, nitrogen fixation, mineral accumulation, seed yield, and seed quality of a soybean low-phytate line. Plants.8:1-3.
- Tan, K. H. 2000. Environmental Soil Science. Marcel Dekker, Inc. New York. p:22
- Tan, K. H. 2008. Soil in the Humid Tropics and Monsoon Region of Indonesia. CRC Press. Boca Raton. 557 p.
- Tomasic, M., Z. Zgorelec, A. Jurisic dan I. Kisic. 2013. Cation exchange capacity of dominant soil types in the republic of Croatia. Journal of Central European Agriculture. 14: 937-951.
- Uchimiya, M., and S. Hiradate. 2014. Pyrolysis temperature-dependent changes in dissolved fosforus speciation of plant and manure biochar. Journal of Agricultural and Food Chemistry. 62: 1802-1809.
- Weisany. W., Y. Raei, and K. H. Allahverdipoor. 2013. Role of some of mineral nutrients in biological nitrogen fixation. Bulletin of Environment, Pharmacology, and Life Sciences. 2:77-84.
- Wen, P., Z. Wu, Y. He, Y. Han, & Y. Tong. 2016. Characterization of p(AA-co-AM)/bent/urea and its swelling and slow release behavior in a simulative soil environment. Journal Applied Polymer Science. 43082:1-11.
- Wibisono, M. G., Sudarsono, dan Darmawan. 2016. Karakteristik andisol berbahan induk breksi dan lahar dari bagian timur laut Gunung Gede, Jawa Barat. Jurnal Tanah dan Iklim. 40: 61-70.



- Widowati, Asnah, & W. H. Utomo. 2014. The use biochar to reduce nitrogen and potassium leaching from soil cultivated with maize. *Journal of Degraded and Mining Land Management*. 2: 211-218.
- Wong, J. W. C., J. B. W. Webber, and U.O. Ogbonnaya. 2019. Characteristics of biochar porosity by NMR and study of ammonium ion adsorption. *Journal of Analytical and Applied Pyrolysis*. 143:1-9.
- World Reference Base for Soil Resources. 2006. A Framework for International Classification, Correlation, and Communication. *World Soil Resources Reports* 103. Food and Agriculture Organization of The United Nations, Roma.145p.
- Xing, X., F. Fan, and W. Jiang. 2018. Characteristics of biochar pellets from corn straw under different pyrolysis temperatures. *Royal Society Open Science*. 5:1-10.
- Yan, F., S. Schubert, and K. Mengel. 1996. Soil pH increase due to biological decarboxylation of organic anions. *Soil Biol Biochem*. 28:617-624.
- Yang, S., X. Chen, Z. Jiang, J. Dieng, X. Sun, and J. Xu. 2020. Effects of biochar application on soil organic carbon composition and enzyme activity in paddy soil under water-saving irrigation. *International Journal of Environmental Research and Public Health*. 17:1-17.
- Yao, Y., B. Gao, M. Zhang, M. Inyang, and A. R. Zimmerman. 2012. Effect of biochar amendment on sorption and leaching of nitrate, ammonium, and fosfat in a sandy soil. *Chemosphere*. 89:1467-1471.
- Yu, Y-M. & N. K. Fukagawa. 2020. Protein and amimno acids. *Present Knowledge in Nutrition*. 1: 15-35.
- Zhang, Z., H. Liao, and W. J. Lucas. 2014. Molecular mechanisms underlying fosfat sensing, signaling, and adaption in plants. *Journal of Intergrative Plant Biology*. 56:192-220.
- Zhou, L. D. Xu, Y. Li, Q. Pan, J. Wang, L. Xue, and A. Howard. 2019. Fosforus and nitrogen adsorption capacities of biochar derived from feedstocks at different pyrolysis temperatures. *Water*. 11:1-16.
- Zwetsloot, M. J., J. Lehmann, and D. Solomon. 2014. Recycling slaughterhouse waste into fertilizer: how do pyrolysis temperature and biomass additions affect fosforus availability and chemistry?. *Journal of the Science of Food and Agriculture*. 95: 281-288.