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Influence of Biochar on Growth, Yield and Quality of Broccoli

H. B. F. Zannatul[1*], A. Akter[2,] I. Ferzana[3], H. Abdul[4], J, G, M, Helal[5]
Sher-e-Bangla Agricultural University, Dhaka, Bangladesh
zannatulafes@gmail.com

Abstract: *Broccoli is one of the most important, nutrient-rich vegetables among cole crops which belong to the family Brassicaceae. It is known to be a healthy and delectable vegetable which is rich in many nutrients. Biochar is considered as a potential substitute for soil organic matter (SOM). Biochar addition to low organic carbon soils can act as a feasible solution to keep soil biologically active for the cycling of different nutrients. The application of biochar could improve soil fertility, increase crop yield, enhance plant growth and microbialabundance, and immobilize different contaminants in the soil. Due to thelarge surface area of biochar, which generally depends upon the types of feedstock and pyrolysis conditions, it helps to reduce the leaching of fertilizers from the soil and supplies additional nutrientsto growing crops. In view of the above importance all possible issues related to biochar application should beconsidered. Previous literature review shows that applying biochar to the broccoli plant improved only the leaf area and root length with significant changes. The highest yield per plot (4.49 kg), bud weight (499.37g), bud diameter (16.55 cm), and yield per hectare (14.98 t ha^{-1}) of broccoli was found to be significant in biochar treated plot (T_2: PSB 100 L/ha + Biochar 30 t ha^{-1}). Considering classification of the flowering heads by categories, M (manure pellet) + EB (enriched-biochar amended soil and organic fertilizer) + AND (manure pellet and enriched-biochar amended soil treated with organic fertilization) treatments showed a higher number of first category flowering heads with regard to other treatments. Therefore, the use of biochar is an effective approach for potential nutrient reservoir for plants and a good amendment to improve soil properties.*

Keywords: Biochar, soil organic matter, feedstock, depletion of nutrients adsorption, flowering heads, and potential nutrient reservoir

REFERENCES

[1]. Bhattarai, P., Lamichhane, B., Subedi, P., Khanal, A., Burlakoti, S. and Shrestha, J. (2022). Effect of different levels of charcoal and nitrogen on growth and yield traits of broccoli. *J. Agric. Sci.* **1**(33): 1-8.

[2]. Chojnacka, K., Moustakas, K. and Witek-Krowiak, A. (2020). Bio-based fertilizers: A practical approach towards circular economy. *Bio. Tech*. **295**: 122223.

[3]. FAOSTAT. (2020). Food and Agriculture Organization of the United Nations. Statistics division, corporate statistical database (FAOSTAT). Retrieved 10 February 2021. pp. 1-17.

[4]. Gobozi, T.K.S. (2018). Evaluation of a peri-urban smallholder farmers' soil amendment practices on soil quality and crop growth, yield and quality. M.S. thesis. Department of Soil Science, Faculty of Agrisciences. Stellenbosch University. pp. 77-78.

[5]. Horák, J., Kotuš, T., Toková, L., Aydın, E., Igaz, D., Šimanský, V. (2021). A Sustainable Approach for improving soil properties and reducing n_2o emissions is possible through initial and repeated biochar application. *Agron.* **11**(3): 582.

[6]. Jamir, I., Ramteke, P.W. Bahadur, V. and Shukla, P.K. (2020). Influence of photosynthetic bacteria and biochar on growth, yield and biochemical parameters of broccoli (*Brassica oleracea* var. italica). *J. Pharma. Phytochem.* **9**(2): 815-818.

[7]. Jatav, H.S., Singh, S.K., Jatav, S.S., Rajput, V.D., Parihar, M., Mahawer, S.K., Singhal, R.K. and and Sukirtee, R. (2021). Importance of biochar in agriculture and its consequence. *IntechOpen*. **1**: 1-10.

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[8]. Lee, S.K., Chiang, M.S., Hseu, Z.Y., Kuo, C.H. and Liu, C.T. (2022). A photosynthetic bacterial inoculant exerts beneficial effects on the yield and quality of tomato and affects bacterial community structure in an organic field. *Front. Microbiol.* **13**: 959080.

[9]. Montoya, D., Fernández, J.A., Francoa, J.A. and Ballestaa, M.C.M. (2022). Enriched-biochar application increases broccoli nutritional and phytochemical content without detrimental effect on yield. *J. Sci. Food Agric.* **102**: 7353-7362.

[10]. Nagraj, G.S., Anita, C., Swarna, J., Amit, K.J. (2020). Nutritional composition and antioxidant properties of fruits and vegetables. Academic press, school of food science and environmental health, college of sciences and health, technological university, Dublin - city campus, dublin, Ireland. pp. 5-17.

[11]. Oni, B.A., Oziegbe, O. and Olawole, O.O. (2019). Significance of biochar application to the environment and economy. *Ann. Agric. Sci.* **64**(2): 222–236.

[12]. Rajput, V.D., Gorovtsov, A.V., Fedorenko, G.M., Minkina, T.M., Fedorenko, A.G. and Lysenko, V.S. (2020). The influence of application of biochar and metal-tolerant bacteria in polluted soil on morpho-physiological and anatomical parameters of spring barley. *Environ. Geochem. Health.* **27**: 1-3.

[13]. Schmidt, H.P., Kammann, C., Hagemann, N., Leifeld, J., Bucheli, T.D. and Monedero, S.M.A. (2021). Biochar in agriculture–a systematic review of 26 global meta-analyses. *G.C.B. Bioenergy.* **13**: 1708–1730.

[14]. Tarafder, S.K., Biswas, M., Alim, M.A., Mondal, A.B. (2023). The Effects of organic nutrient sources on yield and shelf life of broccoli. *Int. J. Hort. Sci. Tech.* **10**(1): 87-96.

[15]. Tomczyk, A., Sokołowska, Z. and Boguta, P. (2020). Biochar physicochemical properties: pyrolysis temperature and feedstock kind effects. *Rev. Environ. Sci. Biotechnol.* **19**: 191-215.

[16]. Tomczyk, A., Sokołowska, Z. and Boguta, P. (2020). Biochar physicochemical properties: Pyrolysis temperature and feedstock kind effects. *Rev. Environ. Sci. Bio.* **19**(1): 191–215.

[17]. Trupiano, D., Cocozza, C., Baronti, S., Amendola, C., Vaccari, F., Lustrato, G., Lonardo, S., Fantasma, F., Tognetti, R. and Scippa, G. (2017). The effects of biochar and its combination with compost on lettuce (*Lactuca sativa* L.) growth, soil properties, and soil microbial activity and abundance. *Int. J. Agron.* **2**: 1-12.

[18]. Wang, D., Jiang, P., Zhang, H. and Yuan W. (2020). Biochar production and applications in agro and forestry systems: A review. *Sci. Total Environ* **10**: 137775.

[19]. Wang, G., Govinden, R., Chenia, H.Y., Ma, Y., Guo, D., and Ren, G. (2019). Suppression of phytophthora blight of pepper by biochar amendment is associated with improved soil bacterial properties. *Biol. Fertility. Soil.* **55**(8): 813–824.

[20]. Yaashikaaa, P.R., Kumara, B.P.S., Varjanic, S. and Saravanand, A. (2020). A critical review on the biochar production techniques, characterization, stability and applications for circular bioeconomy. *Biotech. Reports.* **28**: e00570.

[21]. Youssef, S., Riad, G., Abu El-Azm, N., and Ahmed, E. (2018). Amending sandy soil with biochar or/and superabsorbent polymer mitigates the adverse effects of drought stress on green pea. *Egypt. J. Hortic.* **45**: 169-183.

[22]. Zhang, M., Liu, Y., Wei, Q., Liu, L., Gu, X., and Gou, J. (2022). Biochar-based fertilizer enhances the production capacity and economic benefit of open-field eggplant in the karst region of southwest China. *Agric.* **12**(9): 1388.

[23]. Zulfiqar, F., Moosa, A., Nazir, M.M., Ferrante, A., Ashraf, M., Nafees, M., Chen, J., Darras, A. and Siddique, K.H.M. (2022). Biochar: An emerging recipe for designing sustainable horticulture under climate change scenarios. *Front. Plant Sci.* **13**: 1018646.