

ABSTRACT

The management of a massive amount of food and agro-waste production as a result of population growth has become a major source of concern due to its negative impact on the environment. Pyrolysis is a potential solution to waste management problems and the sustainable use of waste to produce useful products. The current study is aimed at evaluating the fertilizer potential of chicken feather and rice-straw derived biochar on sunflower (*Helianthus annuus* L.) yield. The biochar of both feedstocks, rice-straw and chicken feathers, was prepared at three temperatures viz: 400 °C (RB1 and CFB1 respectively), 500 °C (RB2 and CFB2 respectively), and 600 °C (RB3 and CFB3 respectively). The results of FTIR, SEM and EDX proved the presence of functional groups, porous structure and micro and macro-nutrients (N, K, Ca, Si, P and Na) on biochar surface which improved the soil properties and plant growth. The proximate and CHNS analysis of biochar showed that ash content and carbon content increased while volatile content (VC), nitrogen (N), hydrogen (H) and O/C decreases with rise of pyrolysis temperature, which affect the plant growth significantly. Sunflower plants were grown in soil treated with six types of biochar and biochar mixture (RB2+CFB2) prepared in three ratios i.e., 1:1, 1:2 and 2:1, each at three levels of biochar (2%, 4% and 6%), control (0%) and commercial fertilizer (CF). The pot trial was conducted in Botanical Garden with each treatment having three replicates. The treatment CFB3L (2% amendment of CFB3) showed better result with high plant length, flower weight and plant weight than control and even CF. The pH and electrical conductivity (EC_e) were also tended to be observed increased with pyrolysis temperature and biochar quantity in soil, which strongly affect the bioavailability of micro and macro-nutrients in soil for plant. This study offered, the biochar as solution for sustainable management of waste and promising alternative to commercial fertilizer.