

ABSTRACT

Synthesis of biochar based nano-composite has become an “apple of eye” for many researchers’ and it can enhance the efficiency of biochar and nano-materials. The resultant nano-composites show great enhancement in their active positions, functional group, surface area, pore features, morphology, photo-catalytic ability and adsorption capacity etc. Furthermore, they also enhance the soil texture and porosity as soil conditioner. Fabrication of biochar based nano-composites has become a fascinating practice for rising multi-dimensional applications of biochar and nano-materials. The main purpose of present study was production of bio-char from vegetable peels, fruits peels and other agricultural waste and its modification with iron based nano-materials. The Iron and biochar based nano-composite have been analyzed through different spectroscopic techniques i.e. UV-visible spectroscopy, Fourier transform infra-red spectroscopy and atomic absorption spectroscopy. Multi-dimensional applications of iron based nano-composite i.e. methylene blue degradation, heavy metal adsorption i.e. nickel, arsenic, chromium, *Cucumis sativus* seed germination and anti-microbial activity against *Pseudomonas*, *Bacillus subtilis* and *Escherichia coli* have been studied. It was examined that even minute quantity of nano-composite was also effective to degrade the dye and the iron and biochar nano-composite has more adsorption capacity for arsenic removal than other heavy metals.