Abstract

Agronomic practices and industrialized development have polluted the atmosphere with heavy metals and many other substances that results into various human health concerns. A qualified study was accomplished to estimate the effectiveness of pure biochar and iron doped biochar (Fe-Bc) to enhance development and physiology of *Zea mays L.* plants grown under arsenic stress soil. A study was carried out with 15 changed treatments like Control, Pure Bc 1%, Pure Bc 2%, Fe-Bc 0.5%, Fe-Bc 1%, As 100mg/kg, As 100+PBc 1%, As 100+PBc 2%, As 100+Fe-Bc 0.5%, As 100+Fe-Bc 1%, As 200mg/kg, As 200+PBc 1%, As 200+PBc 2%, As 200+Fe-Bc 0.5%, As 200+Fe-Bc 1% having three replicates. The results revealed that arsenic stress massively ($p \leq 0.01$) decreased the fresh weights of roots and shoots due to high levels of As toxicity. Similarly, the concentration of chl a and b was significantly increased (1 times and 2 time) with application of pure biochar respectively, in comparison to control. There was a significant decrease in shoot H_2O_2 (84%) and MDA (91%) when compared with As alone treatments due to higher actions of antioxidant enzymes *viz.* APX (1-folds) and CAT (4-folds) in comparison to As alone. Correspondingly, roots total protein (76%) and total phenolics (161%) conc. were increased with the application of Fe-Bc in comparison to control. Overall, it was revealed that application of pure and iron enriched biochar showed maximum effectiveness to minimize As stress in soil and *Zea mays L.* plant. Therefore, applications of Fe-Bc found to be an economical and sustainable soil conditioner in developing countries comprising Pakistan to minimize the damaging effects of As on human health and crops.