ABSTRACT

Drought is condition directly related with the prospect of Climate Change and rising global temperature. Drought directly imposes a serious threat on plants and there productivity. A comparative study was performed in order to evaluate the ability of Zn and Fe doped Biochar as well as Azospirillum brasilense and Bacillus Subtilis to improve the growth and physiology of Solanum Melongena L. plants grown under deficit irrigation (65%) condition. A pot study was conducted with 9 different set of treatments such as (T0) Control, (T1) DI(65%) with no amendment, (T2) Zn Biochar (1.2%) + Deficit Irrigation (65%), (T3) Fe Biochar (1.2%) + Deficit Irrigation (65%), (T4) Azospirillum brasilense+ Deficit Irrigation (65%), (T5) Bacilus subtilus+ Deficit Irrigation (65%), (T6) Zn Biochar (1.2%) +Azospirillum brasilense+ Deficit Irrigation (65%), (T7) Zn Biochar (1.2%)+ Bacilus subtilus+ Deficit Irrigation (65%), (T8) Fe Biochar (1.2%) +Azospirillum brasilense+ Deficit Irrigation (65%), (T9) Fe Biochar (1.2%) + Bacilus subtilus+ Deficit irrigation (65%) having three replicates. The results showed that drought significantly reduced the fresh and dry weight of leaf, stem and roots due to less availability of water. Similarly, the chlorophyll and protein content was reduced in the DI without amended pot sample but the co-application of Bc and PGPR increased the chlorophyll and protein content(>60% and >45% respectively). Especially, the Fe Biochar + Bacilus subtilus provided significant results. The RWC was highest in the co-application (>70%) rather than in the single application. The ROS(MDA and H2O2) production was also significantly reduced in T6-T9. Altogether, it was found that application of Azospirillum brasilense, Bacilus subtilus, Fe Biochar and Zn Biochar showed maximum efficiency in combating drought stress in soil and help the growth of Solanum Melongena L., plant. Thus, the application of biochar with the assistance of microbes proved to be eco-friendly and cost effective soil conditioner in developing countries including Pakistan to limit the negative effects of drought.