Abstract

Fusarium oxysporum is the most disturbing fungal pathogen of tomato plants (*Solanum lycopersicum 'Roma'*) managed by achieving sustainable means based on antagonistic microbes, plant extract and biochar. Pathological evaluations were made in field survey. Morphological and molecular characterization was done for pathogen and antagonistic microbes. In- vitro bioassay against fungal pathogen exhibited with microbes (fungi and bacteria) and plant extract. Individual and combine inoculation of microbes (fungi and bacteria), plant extract and biochar for the evaluation of growth and physiological parameter in tomato plant. *T. harzianum, B. subtilis, and C. longa* exhibit more than 90% in- vitro inhibition against *F. oxysporum*. By using Univariate ANOVA, growth parameters were significantly affected ($P< 0.01$) for single and combined inoculum of microbes and plant extract and biochar inoculum with fungi and plant extract. Physiological parameters (chlorophyll a and chlorophyll b) were significantly affected ($P< 0.01$) for the individual inoculum of microbes (bacteria) and for combine inoculum of microbes and plant extract and biochar inoculum with bacteria. Physiological parameter Proteins were significantly affected ($P< 0.01$) for single inoculum of microbes (bacteria) and plant extract and for combine inoculum of microbes and plant extract. Growth parameters of tomato plant were enhanced when microbial antagonists (fungi and bacteria) were individually and combined inoculated. Environment friendly alternatives face a number of challenges in their development, manufacture and applications thus research on their productions, formulations and delivery should be greatly assist in their commercialization. The requirement for environmental friendly products intended for plant protection leads to a preference of biopesticide formulations with good efficacy and stability.