

Potential of *Bacillus subtilis* inoculation in Biorichar™ amended soil for suppression of *Fusarium* wilt of banana (*Musa acuminata* cv. Berangan) under water stress condition

ABSTRACT

The present research was conducted to evaluate the ability of *Bacillus subtilis* to suppress *Fusarium* wilt disease of banana in Biorichar™ amended soil under different soil moisture regimes. Banana plants were inoculated with different volumes of *Bacillus subtilis* (0, 20, 40 and 60 mL) given at concentration 10^8 CFU mL⁻¹ and subjected to three water stress levels based on field capacity (FC) viz. well watered (100% FC), mild stress (75% FC), and severe stress (50% FC). Banana plantlets were inoculated with *Fusarium oxysporum* one week after *Bacillus subtilis* were applied. The results showed that, minimum percentage of disease incidence in banana plants was recorded at high *Bacillus subtilis* rate (40 mL and 60 mL) at 50% FC. However, at 75% FC and 100% FC conditions, disease incidence increased from 35.28% to 45.09% following the time. Proline content showed 0.33% high under 75% FC compared to 50% FC at 45 DAT and similar trend was observed at 90 DAT. Malondialdehyde (MDA) content in banana plants was high in control treatment than those inoculated with *Bacillus subtilis*. 100% FC condition gave significantly higher net photosynthesis (14.95%), stomatal conductance (60.47%), transpiration rate (54.58%) and vapor pressure deficit (14.14%) compared to 50% FC at 45 DAT. However, values of net photosynthesis at 90 DAT were 30.07% and 20.79% lower at 50% FC and 100% FC, respectively in comparison to the values recorded at 45 DAT as pathological process progressed. Inoculation of *Bacillus subtilis* @ 60 mL increased photosynthesis rate by 9.07% as compared to non-inoculated plantlets at 100% FC at 45 DAT. However, no significant difference observed when the plants were inoculated by *Bacillus subtilis* @ 40 mL and @ 60 mL under 75% FC condition. Therefore, inoculation of *Bacillus subtilis* @ 60 mL could be a promising biological control agent that can trigger resistance against *Fusarium* wilt in susceptible Berangan banana under water stress condition.

Keyword: F PGPR; Photosynthesis; Proline content; Water stress; Disease incidence