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Root-associated microorganisms for optimizing biological control in tomato

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Tomato is one of the most widely consumed vegetable crops worldwide, but its production is constantly threatened by numerous pests. In the context of Integrated Pest Management (IPM), the induction of natural plant defence mechanisms mediated by soil microorganisms is considered a sustainable solution for pest control. Plant Growth-Promoting Fungi (PGPF) and Rhizobacteria (PGPR) are promising alternatives to synthetic chemicals, but their effects on plant-herbivore-natural enemies interactions remain largely unknown. We studied the olfactory response of two natural enemies (i.e., the predatory beetle *Cryptolaemus montrouzieri* and the parasitic wasp *Eretmocerus eremicus*) of tomato key pests to volatiles emitted by tomato plants previously inoculated with fungal and bacterial strains showing PGP traits in a two-way olfactometer, under laboratory conditions. Three fungal species, including commercial strains of two *Trichoderma* mycoparasitic fungi (i.e., *T. asperellum* and *T. harzianum*) and an entomopathogenic *Beauveria bassiana* strain (ATCC 7404), and six bacterial species (i.e., commercial strains of *Bacillus subtilis* and *B. amyloliquefaciens*, and laboratory isolates of *B. spizizenii*, *Pseudomonas fluorescens*, *P. veronii* and *P. gessardii*) were tested 3 and 7 days after inoculation, in comparison with untreated plants. In preliminary observations, *C. montrouzieri* showed significant attraction towards plants inoculated with Pseudomonas spp. and *T. asperellum* 3 and 7 days after inoculation, respectively. By contrast, the other treatments generally induced a repellent effect with a significant preference by beetle adults towards untreated plants. A similar trend was recorded for *E. eremicus*. This preliminary study can provide the basis for understanding tri-trophic interactions triggered by root-associated microorganisms in tomato cropping system. Future investigations including further pest/natural enemy combinations will help in understanding the role of Volatile Organic Compounds (VOCs) upon plant inoculation with PGPF and PGPR to develop plant control strategies through the use of biostimulants.