ABSTRACT

Plants possess specific mechanisms that quickly detect precise environmental changes and allow them to respond to multiple stress conditions, thereby, minimizing damage and conserving valuable resources for growth and development. These external stimuli bring about changes in plants at physiological, biochemical and molecular/genetic level. Of the various strategies, presence of natural compounds in plants helps in reducing stress and uplifts the plants growth. Brassinosteroids are one such group of compounds that are ubiquitously distributed in plant kingdom and possess anti-stress properties against various abiotic and biotic factors. In the present study, in vitro effects of 28-Homobrassinolide were evaluated on susceptible (Pusa Ruby) and resistant (PNR-7) tomato cultivars during root-knot nematode, *Meloidogyne incognita* infection. Seeds of both the cultivars after surface sterilization were treated with different HBl concentrations (10^{-11}, 10^{-9} and 10^{-7} M) and kept under controlled conditions for germination. The seedlings were then inoculated with infective second-stage juveniles of *M. incognita*. Physiological changes in terms of percentage germination, total plant height, root and shoot length, root and shoot weight and number of galls were recorded at regular intervals for seven days. In addition, biochemical alterations in the activities of antioxidative enzymes (CAT, APOX, GPOX, GR, GPOD and SOD) were evaluated alongwith modulations in the total content of non-enzymatic antioxidants (TPC, TFC, AsC and GSH) after regular intervals for seven days. Further, qualitative analysis of phytohormones was also done using LC/MS at the most effective HBl concentration (120hrs; 10^{-9}M in Pusa Ruby and 72hrs; 10^{-7}M in PNR-7). Results ascertained showed reduced growth parameters in susceptible cultivar after nematode inoculation that was enhanced after HBl treatment. While in PNR-7, much variation was not seen, but here also, HBl application further improved the growth of plants. For biochemical changes, observations recorded showed variations in the activities of antioxidative enzymes and total content of antioxidants with nematode inoculation in both the cultivars. However, with HBl application, the overall activities of antioxidative enzymes and the total content of antioxidants was improved. In qualitative analysis of phytohormone using LC/MS, three hormones viz. Putrescine, Salicylic acid and Jasmonic acid were detected.
These were found in both the cultivars after nematode stress (Control II) and in HBl treated plants. In addition, when the two cultivars were compared with each other, more prominent results were found in the resistant cultivar. Hence, the study suggested an anti-stress role of brassinosteroids against nematode pathogenesis in tomato cultivars.