

Bioefficacy of Vermicompost on *Meloidogyne incognita* (Kofoid & White) Chitwood Infecting Tomato Plants

Use of vermicompost is an alternative way to manage plant parasitic nematodes as well as to increase crop productivity. Therefore, the aim of the present study was to use an eco-friendly and inexpensive approach of applying vermicompost as a replacement for pesticides for enhancing the biomass and bioactive components along with mitigation of *M. incognita* induced stress in tomato. Tomato seeds were pre-soaked in various dilutions of vermicompost extract before being planted in clay pots. Plants at the true leaf stage were transferred to separate pots *having grading mixtures of vermicompost* and soil. The transplanted plants were infected with freshly hatched J2s (@ 2J2/g soil) and water was sprayed on a regular basis to keep the potting mixture wet. After 10 days of nematode infection, the plants were harvested. Several morphological characteristics were evaluated, including root and shoot length, fresh weights of roots and shoots, number of leaves, and number of galls on roots. Further, Biochemical parameters like Protein content, flavonoid content, phenol content, Anthocyanin, Total Glutathione content, proline content, MDA, H₂O₂ content, photosynthetic pigments (Chlorophyll and Carotenoid), Antioxidant enzymes like CAT, APOX, GST were studied using standard protocols. The data were subjected to statistical analysis by using SPSS software version 16.0. Analysis of Variance (ANOVA) and Tukey's Test were employed to observations.

Experimental data shows that all the morphological and biochemical parameters like Protein content, flavonoid content, phenol content, Anthocyanin, Total Glutathione content, proline content, photosynthetic pigments (Chlorophyll and Carotenoid), Antioxidant enzymes like CAT, APOX of tomato seedlings treated with vermicompost were significantly higher as compared to control. This increase was in concentration dependent manner. There was non-significant increase in antioxidant enzymes like DHAR, GST. Further, stress indices like MDA and H₂O₂ content were significantly reduced as compared to control. The current investigation demonstrates the possible impact of vermicompost in boosting tomato plant development. Protein content and anti-oxidative enzyme levels in tomato seedlings increased considerably after the administration of vermicompost. In addition to enzymes, non-enzymatic antioxidants such as ascorbic acid and glutathione concentration were increased in tomato plants fed with vermicompost. Vermicompost also aided in the reduction of MDA and H₂O₂ levels, both of which are considered plant stress signals. As a result of the foregoing observations, vermicompost appears to have a high potential for improving plant development under nematode stress.