

## The Molecular Analysis of Effect of Phytohormones and Spermidine on Tomato Growth under Biotic Stress

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**Abstract :** Tomato is a significant crop of the world and is one of the staple foods of Pakistan. A vast number of plant pathogens from simple viruses to complex parasites cause diseases in tomatoes but fungal infection in our country is quite high. Sometimes the symptoms are too harsh destroying the crop altogether. Countries like our own with continuously increasing massive population and limited resources cannot afford such an economic loss. There is an array of morphological, genetic, biochemical and molecular processes involved in plant resistance mechanisms to biotic stress. The study of different metabolic pathways like Jasmonic acid (JA) pathways and most importantly signaling molecules like ROS/RNS and their redoxin enzymes i.e. TRX and NRX is crucial to disease management, contributing to healthy plant growth. So, improving tolerance in crop plants against biotic stresses is a dire need of our country and world as whole. In the current study, fungal pathogenic strains *Alternaria solani* and *Rhizoctonia solani* were used to inoculate tomatoes to check the defense responses of tomato plant against these pathogens at molecular as well as phenotypic level with jasmonic acid and spermidine pretreatment. All the growth parameters (root and shoot length, dry and weight root, shoot weight measured 7 days post-inoculation, exhibited that infection drastically declined the growth of the plant whereas jasmonic acid and spermidine assisted the plants to cope up with the infection. Thus, JA and Spermidine treatments maintained comparatively better growth factors. Antioxidant assays and expression analysis through real time quantitative PCR following time course experiment at 24, 48 and 72 hours intervals also exhibited that activation of JA defense genes and a polyamine Spermidine helps in mediating tomato responses against fungal infection when used alone but the two treatments combined mask the effect of each other.

**Keywords :** fungal infection, jasmonic acid defence, tomato, spermidine

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