

Programmed Cell Death in Datura and Defensive Plant Response toward Tomato Mosaic Virus

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Abstract : Programmed cell death resembles a real nature active defense in Datura metel against TMV after three days of virus infection. Physiological plant response was assessed for asymptomatic healthy and symptomatic infected detached leaves. The results indicated H₂O₂ and Chlorophyll-a as the most potential parameters. Chlorophyll-a was considered the only significant predictor variant for the H₂O₂ dependent variant with a P value of 0.001 and R-square of 0.900. The plant immune response was measured within three days of virus infection using the cutoff value of H₂O₂ (61.095 μ mol/100 mg) and (63.201 units) for the tail moment in the Comet Assay. Their percentage changes were 255.12% and 522.40% respectively which reflects the stress of virus infection in the plant. Moreover, H₂O₂ showed 100% specificity and sensitivity in the symptomatic infected group using the receiver-operating characteristic (ROC). All tested parameters in the symptomatic infected group had significant correlations with twenty-five positive and thirty-one negative correlations where the P value was <0.05 and 0.01. Chlorophyll-a parameter had a crucial role of highly significant correlation between total protein and salicylic acid. Contrarily, this correlation with tail moment unit was ($r = -0.930$, $P < 0.01$) where the P value was < 0.01. The strongest significant negative correlation was between Chlorophyll-a and H₂O₂ at $P < 0.01$, while moderate negative significant correlation was seen for Chlorophyll-b where the P value < 0.05. The present study discloses the secret of the three days of rapid transient production of activated oxygen species (AOS) that was enough for having potential quantitative physiological parameters for defensive plant response toward the virus.

Keywords : programmed cell death, plant-adaptive immune response, hydrogen peroxide (H₂O₂), physiological parameters

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