Genomic studies in Tomato spotted wilt virus: searching for clues towards control methods

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Orthotospoviruses (genus *Orthotospovirus*, family *Tospoviridae*, order *Bunyavirales*) cause significant losses to a wide range of agronomic and horticultural crops worldwide. The continued emergence of new tospoviruses and resistant breaking strains, and their expansion to new regions and hosts underscore the need to generate new knowledge for a better understanding of the pathogen and the disease. The secondary and tertiary structures of the N and the NSs proteins of Tomato spotted wilt virus (TSWV) were determined using a suite of 3D modeling algorithms. The modelers provided an accurate prediction for the N protein allowing the localization of the conserved residues. For NSs protein models, however, there was no agreement among the three algorithms used. TSWV causes systemic infection in cultivars without the resistant gene, *Sw*-5, whereas the virus is restricted to inoculated leaves in cultivars with it. The response to TSWV infection in tomato cultivars with or without *Sw*-5 was determined at the small RNA level. The TSWV genome was found to be differentially processed among each of the three viral genomic RNAs in the *Sw*-5(-) and *Sw*-5(+) genotypes. In the *Sw*-5(+) cultivar, the large (L) RNA was the source of the highest number of viral-small-interfering RNAs (vsiRNAs), whereas in the *Sw*-5(-) cultivar, the number was higher in the small (S) RNA. The distribution of hotspots showed a higher number of reads per million reads of vsiRNAs of 21 and 22 nt class at the 5' and 3' ends of the L and S RNAs, with less coverage in the medium RNA. The interaction between the DORN1 receptor and eATP was studied for its effect in suppressing virus infection. Two viruses, TSWV and *Turnip mosaic virus* (TuMV) were used with Arabidopsis as the host. Results indicated that the interaction between eATP and DORN1 was not directly driving a reduction in case of both TSWV and TuMV infection in Arabidopsis. However, eATP priming *per se* showed a significant reduction in viral infection suggesting the presence of an alternative receptor or co-receptor for eATP. Findings provided insights into potential role of an eATP-receptor in defense signal against TSWV and TuMV.