

# **PARALLEL ANALYSES OF RNA END REVEAL THE WIDESPREAD DEGRADATION OF ENDOGENOUS mRNAs IN VIROID INFECTED PLANTS**

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Though it is well established that viroid derived small RNA induces the RNA silencing of endogenous mRNA, it is not clear how exactly viroid infection can lead to severe symptom induction given the fact that fewer viroid-derived small RNAs (vd-sRNAs) binding the specific target mRNAs were recovered from the infected plants. In order to answer these questions, the two least expressed (+) and (-) strand derived viroid small RNAs of *potato spindle tuber viroid* (PSTVd) binding to both the 3'UTR and the coding region of tomato mRNAs were analyzed by infecting tomato plants with two variants of PSTVd. Parallel analysis of RNA ends (PARE) obtained from viroid infected plants revealed the wide spread cleavage of the target mRNAs in locations other than the vd-sRNA binding site during the later stages of infection. This implies the involvement of secondary products of viroid infection in the degradation of the endogenous mRNAs at the later stages of infection. This hypothesis was evaluated by analyzing both the PARE sequence, and the antisense small RNAs recovered from both control and viroid infected plants, against a few selected genes. These findings provide the first demonstration of the involvement of secondary small RNAs (sec-sRNAs) in viroid infections, and offer an explanation for the severity disease.