

INVOLVEMENT OF RNA SILENCING IN PLANT RESPONSE TO INFECTIOUS NON-CODING RNAs

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Viroids are minimal non-protein-coding RNA replicons (246-401 nt) infecting plants in which they may incite severe diseases. RNA silencing, a regulatory network that mediates host gene expression and antiviral defense, is also involved in plant-viroid interactions. Small viroid-derived RNAs (vd-sRNAs) similar to the host microRNAs (miRNAs) and small interfering RNAs (siRNAs), the hallmarks of RNA silencing, accumulate in plants infected by both nuclear- and chloroplast-replicating viroids, but their biological roles, including their potential contribution to pathogenesis, are still controversial.

Peach calico (PC) is an extreme chlorosis (albinism) induced in peach by atypical sequence variants of the chloroplast-replicating *Peach latent mosaic viroid* (PLMVd), which differ from the latent- and mosaic-inducing PLMVd variants in having a characteristic insertion of 12-13 nt in a defined position of the genomic RNA. The PC pathogenic determinant has been mapped at this specific insertion, which adopts a hairpin conformation with a UUUU capping tetraloop strictly needed for preserving its pathogenic properties. In the present work, we show that not only the UUUU hairpin tetraloop but also the stem, and in particular its nucleotide composition, plays a major role in eliciting PC, thus indicating that the primary structure of the inserted hairpin could also be involved.

High-throughput sequencing (by Illumina-Solexa technology) of small RNAs libraries from healthy and PC-affected leaves allowed identifying vd-RNAs, peach miRNAs and siRNAs, and their potential precursors and targets. Taking into account the differential accumulation of these small RNAs in symptomatic and non-symptomatic peach tissues, the possible involvement of RNA silencing in PLMVd pathogenicity appears a feasible alternative. Altogether, these data support the view that RNA silencing machinery plays a role in modulating host gene expression as a response to viroid infections.