

Occurrence, Distribution, & Transmission of Alfalfa Viruses in China

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Alfalfa (*Medicago sativa*) is one of the most important forages worldwide with the high quality, and is cultivated throughout China now. Alfalfa is susceptible to a variety of viral diseases during its growth, which caused huge amounts of commercial losses. However, the profile of alfalfa viruses in China remains ambiguous, and the plant viruses transmitted by *Odontothrips loti*, dominant pests in the alfalfa field, are also poorly understood. In the present study, the viral species were investigated in the primary alfalfa growing areas in China. A total of 18 alfalfa viruses were identified through RNA seq and RT PCR. Two new plant viruses, *Medicago sativa* virus 1 (MsV1) and *Medicago sativa* luteovirus 1 (MsLV1), were detected for the first time, and another four viruses, including Alfalfa ringspot associated virus (ARaV), Alfalfa virus F (AVF), Alfalfa enamovirus 1 (AEV1), and Alfalfa deltapartitivirus (ADPV), were identified and reported in China for the first time. Both Alfalfa mosaic virus (AMV) and *Medicago sativa* alphapartitivirus 2 (MsAPV2) are the dominant prevalent and severe pathogens, with infection incidences 91.74% ~ 100%, and 74.42% ~ 97.22% respectively. Additionally, it is the first report that *O. loti* could transmit AMV, and the accumulation of AMV in *O. loti* was monitored by qRT PCR. The first and second instar larvae could acquire AMV within 15 minutes, and the virus can be effectively transmitted after 24 hours of feeding on healthy alfalfa. We also clarified the dynamic changes of AMV in pre adult stages of *O. loti*, and suggested AMV was propagated in the stage of larvae of *O. loti*. These findings provide valuable information for understanding the virome of alfalfa in China, demonstrate thrips *O. loti* involved in alfalfa virus transmission, and improve our fundamental knowledge and prevention tactics of diseases in the alfalfa field.

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