First report of tomato spotted wilt virus in *Zinnia elegans* in China

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Zinnia elegans, a common flowering plant species belonging to the Asteraceae family and native to North America, is widely planted in many home gardens and roadsides in China. In July 2020, *Z. elegans* plants showing necrotic local lesions and mild mosaic on the leaves were found in a courtyard nearby a tobacco field in Qujing, Yunnan, China. These symptoms were observed in about 8.5% of 200 plants examined at this location, and resemble those reported by others on *Z. elegans* infected with tospoviruses (Morales-Diaz et al. 2008). Total RNAs were extracted from 0.1 g of leaf tissues using RNeasy Plant Mini Kit (Qiagen, Germany) and then tested for the presence of tospovirus by RT-PCR with universal primers dTospo-F2/dTospo-R2 (Huang et al. 2017). PCR products of approximately 310 bp were obtained from the samples and sequenced. A BLASTn (GenBank) search showed identity of > 98% with 10 isolates of tomato spotted wilt virus (TSWV). To further confirm the TSWV infection, RT-PCR was performed with specific primers (TSWV-NSmF: 5'-ATGTTGACTTTT TTTGGTAA-3'; TSWV-NSmR: 5'-CTATATCTCATCAA AGAT-3') targeting 909 bp of TSWV NSm gene. A single PCR product was cloned into pMD19-T (TaKaRa, Dalian, China) vector and sequenced (Tsingke, Kunming, China) (GenBank accession No. MW727219). BLASTn analysis revealed the obtained nucleotide sequence shared the highest nucleotide sequence identity of 99.67% with TSWV Heilongjiang-1 isolate (MG878874). TSWV has been reported naturally infecting *Z. elegans* in Mexico (Morales-Diaz et al. 2008) and it is one of the most economically important viruses in the world (Reitz et al. 2020). To our knowledge,

this is the first report of TSWV infection in *Z. elegans* in China.

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Data availability The data used to support the findings of this article are available from the corresponding author upon request.

Declarations

Human and animal studies This study contains no human participants or animals.

Conflict of interest The authors declare that there is no conflict of interest.

References

- Huang KS, Li SL, Sun JH, Wang YC, Jan FJ, Chen TC (2017) Development of a generic method for inspection of tospoviruses. *Eur J Plant Pathol* 150:457–469
- Morales-Diaz MV, Alcacio-Rangel S, La Torre-Almaraz RD (2008) Tomato spotted wilt virus: causal agent of wilt in Miguelito (*Zinnia elegans* Jacquin) in Morelos, Mexico. *Agrociencia* 42:335–347
- Reitz SR, Gao Y, Kirk WDJ, Hoddle MS, Leiss KA, Funderburk JE (2020) Invasion biology, ecology, and management of western flower thrips. *Annu Rev Entomol* 65:17–37

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