



First report of cactus virus X infecting banana (*Musa* spp.) in Korea

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Received: 28 January 2022 / Accepted: 12 March 2022 / Published online: 23 June 2022
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Banana (*Musa* spp.) is one of the most economically important tropical fruit crops and a food staple worldwide (Khoozani et al. 2019). In 2018, the total global banana market was estimated to be worth \$8 billion (Jekayinoluwa et al. 2020). Banana cultivation in Korea is increasing due to global warming and higher demand on the Korean market. In September 2020, 25 banana leaves (1 ~ 2 leaves per plant) with virus-like symptoms, including yellowing and striping, were collected from 11 greenhouses in Jeju City, Jeju province, Korea. To test the occurrence of cactus virus X (CVX) in banana plants, total RNA was extracted from symptomatic leaves and subjected to reverse transcription polymerase chain reaction (RT-PCR) using specific primers for the CVX coat protein (CP) gene as previously described (Park et al. 2018). The CVX was detected on one leaf from 25 banana leaves. The sequence of the PCR product was analyzed against the plant viral genome database from NCBI. The CVX isolate had 97.49%, 97.2%, and 96.31% nucleotide sequence homology with CVX isolates from dragon fruits in Korea (AB930135.1), Taiwan (AY241392.1), and China (KU497494.1), respectively. A consensus complete CP gene sequence of CVX (CVX-BJK) from Korean bananas was deposited in GenBank (LC602995). No other viruses typically occurring in banana, including banana streak virus, banana bunchy top virus, banana bract virus, sugarcane mosaic virus, and banana mild mosaic virus, were detected.

Sap inoculation of CVX-BJK showed yellowing symptoms occurred in *Nicotiana benthamiana*, *Celosia cristata*, and *Chenopodium quinoa* 27 days post-inoculation. The presence of CVX was confirmed in symptomatic herbaceous hosts using RT-PCR with virus-specific primers. To our knowledge, this is the first report of CVX infecting banana plants both in Korea and worldwide. In addition, we show that the host range of CVX can be expanded beyond cacti.

Acknowledgements This work was supported by the Korea Institute of Planning and Evaluation for Technology in Food, Agriculture and Forestry (IPET) through Crop Viruses and Pests Response Industry Technology Development Program, funded by Ministry of Agriculture, Food and Rural Affairs(MAFRA) (grant number 320044-3).

References

- Jekayinoluwa T, Tripathi L, Tripathi JN, et al (2020) RNAi technology for management of banana bunchy top disease. *Food Energy Secur* 9(4):e247
- Khoozani AA, Birch J, Bekhit AEA (2019) Production, application and health effects of banana pulp and peel flour in the food industry. *J Food Sci Technol* 56(2):548–559
- Park CH, Song EG, Ryu KH (2018) Detection of co-infection of *Notoctactus leninghausii* f. *cristatus* with six virus species in South Korea. *Plant Pathol J* 34(1):65–70

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

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