First report of strawberry crinivirus 3 and strawberry crinivirus 4 in strawberry in Iran

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In Iran, strawberry (*Fragaria × ananassa*) is grown in two main regions in the west (Kurdistan Province) and north (Mazandaran, Guilan and Golestan Provinces) of the country. Criniviruses emerged as a major agricultural threat worldwide among strawberries. To monitor two criniviruses, strawberry crinivirus 3 (SCrV-3) and strawberry crinivirus 4 (SCrV-4), 23 strawberry plants showing virus-like symptoms were collected from commercial fields in the west and north of Iran and subjected to RT-PCR. Total RNA was extracted using a silica-capture method, cDNA was synthesized and PCRs were conducted using SCrV3mF (5'- TTG TCATAAGGAGGCACAGC -3') and SCrV3mR (5'- GCT CTTGTCATAGGCACGAA -3') (this work), and SCrV4f1 (5'- CCAATTCTGATCCTATCCTTAGT -3') (Chen et al. 2018) and SCrV4mR1 (5'- AGGCGCGAAATCCAAACT TC -3') (this work) designed from conserved partial virus sequences available in GenBank. Expected RT-PCR products of ~ 673 bp and ~1362 bp in size were obtained from 11 and four samples for SCrV-3 and SCrV-4, respectively, and sequenced. SCrV-3 was detected in samples from both regions, whereas SCrV-4 was detected only from western Iran, suggesting that SCrV-4 may not be evenly distributed in Iran. Nucleotide BLAST analysis confirmed that the two sequences belonged to SCrV-3 and SCrV-4 and were submitted to GenBank as accession numbers OL631153 and MZ868643, respectively. The SCrV-3 sequence shared 98.6% nucleotide identity with the 1a coding region of

isolate M1 of SCrV-3 (EU267168) from Maryland, USA. The Iranian SCrV-4 isolate shared 82.4% nucleotide sequence identity with the 1a coding region of isolate B1156-M3 of SCrV-4 (EU490423) from Maryland, USA. Both SCrV-3 and SCrV-4 have been reported so far in North America (Ding et al. 2016; Diaz-Lara et al. 2021) and China (Chen et al. 2018). To our knowledge, this is the first report of SCrV-3 and SCrV-4 infecting strawberry in Iran.

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Declarations

Ethical approval This article does not contain any studies with human participants or animals performed by the author.

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

References

- Chen D, Ding X, Wang A, Zhang J, Wu Z (2018) First report of strawberry crinivirus 3 and strawberry crinivirus 4 on strawberry in China. *New Dis Rep* 37:24
- Diaz-Lara A, Stevens KA, Klaassen V, Hwang MS, Al Rwahnih M (2021) Sequencing a Strawberry Germplasm Collection Reveals New Viral Genetic Diversity and the Basis for New RT-qPCR Assays. *Viruses* 13:1442
- Ding X, Li Y, Hernández-Sebastià C, Abbasi PA, Fisher P, Celetti MJ, Wang A (2016) First report of strawberry crinivirus 4 on strawberry in Canada. *Plant Dis* 100:1254

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