



## First report of *Hop stunt viroid* in *Hibiscus rosa-sinensis* in Italy

M. Luigi<sup>1</sup>, A. Manglli<sup>1,2</sup>, L. Tomassoli<sup>1\*</sup> and F. Faggioli<sup>1</sup>

<sup>1</sup> *Consiglio per la ricerca e la sperimentazione in agricoltura - Plant Pathology Research Centre, Via C.G. Bertero, 22 - 00156 Rome, Italy;* <sup>2</sup> *Department of Agricultural and Forest System Management, "Mediterranea" University of Reggio Calabria, Loc. Feo di Vito, 89122, Reggio Calabria, Italy*

\*E-mail: laura.tomassoli@entecra.it

**Received:** 07 Nov 2012. **Published:** 10 Apr 2013. **Keywords:** viroid, ornamental plant, molecular characterisation

*Hop stunt viroid* (HSVd), type member of the *Hostuviroid* genus in the *Pospiviroidae* family, has a very wide host range that includes trees, shrubs and herbaceous plants. In grapevine and almond, HSVd infection may be latent, whereas in other plants it causes various specific disorders; these include stunt on hop, dapple fruit on peach and plum, fruit deformation and rugosity on apricot and plum, pale fruits on cucumber and cachexia on citrus. All these symptoms can lead to very high economic impact. In the past, *Hibiscus* spp. amongst ornamental plants were also reported as natural host of HSVd (Sänger, 1988), but further information on this has been lacking.

Recently, a survey of the phytosanitary status of ornamental hibiscus was conducted in wholesale nurseries in Central Italy (Manglli *et al.*, 2012). Plants of *Hibiscus rosa-sinensis* showing symptoms resembling virus infection were first examined for the presence of *Hibiscus chlorotic ringspot virus* (HCRSV), *Hibiscus latent Singapore virus* (HLSV) and *Hibiscus latent Fort Pierce virus* (HLFPV). However, several plants belonging to two different cultivars, showing both severe symptoms of reduction in plant growth and upward curling and deformation of leaves (Fig. 1), tested negative for these viruses. Moreover, the observed symptoms did not resemble those of known viruses in hibiscus. Consequently, the same plants were tested for HSVd using a RT-PCR protocol by Faggioli *et al.* (2001) employing two primer pairs (VP-19 and VP-20; HSVFL1 and HSVFL2) designed respectively by Astruc *et al.* (1996) and Kofalvi *et al.* (1997). Out of 17 plants showing the aforementioned symptoms, four samples gave positive results. By contrast, HSVd was not detected in any of the 60 leaf samples showing only yellow spots and chlorotic mottle on leaves that tested positive for HCRSV, HLSV and/or HLFPV.

The four amplification products were cloned (pGem-T vector, Promega, WI, USA) and sequenced. Sequence analysis of different clones for each isolate (GenBank Accession Nos. KC137256 to KC137266) revealed that two isolates showed the same size (296 nt) and that both had a high homology amongst clones and between the two isolates. Furthermore, both isolates were closely related to a Turkish plum isolate (EF523829, Gazel *et al.*, 2008) belonging to the Hop-group, as shown by the HSVd

phylogenetic tree (Fig. 2; Kofalvi *et al.*, 1997). The sequences of the other two isolates were 299 nt long and also showed a high homology amongst clones and between the two isolates. They were practically identical to an apricot isolate (Y08437, Kofalvi *et al.*, 1997), thus grouping in the recombinant Plum-Citrus phylogenetic group (Fig. 2). These results suggest a different origin of infection in the vegetative propagation and cultivation of hibiscus plants. This study confirms that *Hibiscus rosa-sinensis* is a natural host of HSVd as reported by Sänger in 1988. However, to our knowledge, this is the first report of HSVd in *H. rosa-sinensis* in Italy.

### References

- Astruc N, Marcos JF, Macquaire G, Candresse T, Pallas V, 1996. Studies on the diagnosis of hop stunt viroid in fruit trees: Identification of new hosts and application of a nucleic acid extraction procedure based on non-organic solvents. *European Journal of Plant Pathology* **102**, 837-846. [http://dx.doi.org/10.1007/BF01877053]
- Faggioli F, Ragozzino E, Barba M, 2001. Simultaneous detection of stone and pome fruit viroids by single tube RT-PCR. *Acta Horticulturae* **550**, 59-64.
- Gazel M, Serce CU, Çağlayan K, Faggioli F, 2008. Sequence variability of *Hop stunt viroid* isolates from stone fruits in Turkey. *Journal of Plant Pathology* **90**, 23-28.
- Kofalvi SA, Marcos JF, Cañizares MC, Pallás V, Candresse T, 1997. *Hop stunt viroid* (HSVd) sequence variants from *Prunus* species: evidence for recombination between HSVd isolates. *Journal of General Virology* **78**, 3177-3186.
- Manglli A, Adkins S, Tiberini A, Tomassoli L, 2012. Investigation on the phytosanitary status of major ornamental hibiscus species in Italy to assess virus infection. *Proceedings of the 13th International Symposium on Virus Diseases of Ornamental Plants*, 2012, Norway, p. 28. [http://www.bioforsk.no/ikbViewer/Content/98215/FOKUS\_7-9\_ISVDOP-13\_fin.pdf]
- Sänger HL, 1988. Viroids and viroid diseases. *Acta Horticulturae* **234**, 79-87.



Figure 1

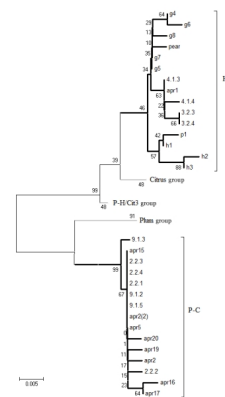


Figure 2

**To cite this report:** Luigi M, Manglli A, Tomassoli L, Faggioli F, 2013. First report of *Hop stunt viroid* in *Hibiscus rosa-sinensis* in Italy. *New Disease Reports* **27**, 14. [http://dx.doi.org/10.5197/j.2044-0588.2013.027.014]

©2013 The Authors

This report was published on-line at [www.ndrs.org.uk](http://www.ndrs.org.uk) where high quality versions of the figures can be found.