



A new begomovirus species and betasatellite causing severe tomato leaf curl disease in Ranchi, India

Punam Kumari, Achuit K Singh, Brotati Chattopadhyay and Supriya Chakraborty*

Molecular Virology Laboratory, School of Life Sciences, Jawaharlal Nehru University, New Delhi - 110067, India

*E-mail: supriyachakrasls@yahoo.com

Received: 18 Feb 2010. Published: 04 Mar 2011.

Leaf curl disease of tomato (ToLCD) has become a serious problem across the Ranchi district of Jharkhand, India. Infected plants exhibit symptoms consisting of severe leaf rolling, leaf curling and yellowing typical of begomoviruses. Viral replicative form (RF) DNA was isolated from affected tomato plants as described previously (Chakraborty *et al.*, 2003) and the association of a begomovirus and betasatellite was confirmed by PCR using component-specific primers (Wyatt & Brown, 1996; Briddon *et al.*, 2002). The viral genome (~2.7 kb) was cloned in pUC18 following digestion of RF DNA with *Pst* I. The PCR amplified betasatellite was cloned into pTZ57R/T.

The complete sequences of the begomovirus (GenBankAccession No. GQ994095) and betasatellite (GQ994096) were shown to consist of 2,762nt and 1,349nt respectively. Sequence alignments using MegAlign (DNASTAR, Madison, WI, USA) showed the virus to have the highest levels of nucleotide sequence identity (88.3%) with *Tobacco curly shoot virus* (AJ457986) and the betasatellite (74.5%) with Tomato leaf curl Bangladesh betasatellite(AJ542489). To other begomoviruses infecting tomatoes in India the levels of sequence identity were between 71 and 85%. This indicates that both the virus and betasatellite are new species, for which the names *Tomato leaf curl Ranchi virus* (ToLCRnV) and Tomato leaf curl Ranchi betasatellite (ToLCRnB) are proposed.

Agrobacterium-mediated inoculation of partial tandem repeat constructs of ToLCRnV and ToLCRnB induced typical ToLCD symptoms in tomato. However, in common with some betasatellite-associated begomoviruses,

ToLCRnV alone was also capable of inducing leaf curl symptoms. Thus, ToLCRnV is a novel monopartite begomovirus which, in association with a new species of betasatellite, causes severe ToLCD in Ranchi, India. The presence of ToLCRnV needs to be considered, along with the already reported begomoviruses infecting tomatoes, in studies aiming to develop tomato cultivars with stable resistance to tomato-infecting begomoviruses in India.

References

- Briddon RW, Bull SE, Mansoor S, Amin I, Markham PG, 2002. Universal primers for the PCR-mediated amplification of DNA β : a molecule associated with some monopartite begomoviruses. *Molecular Biotechnology* **20**, 315-318. [doi:10.1385/MB:20:3:315]
- Chakraborty S, Pandey PK, Banerjee MK, Kalloo G, Fauquet CM, 2003. Tomato leaf curl Gujarat virus, a new begomovirus species causing a severe leaf curl disease of tomato in Varanasi, India. *Phytopathology* **93**, 1485-1495. [doi:10.1094/PHYTO.2003.93.12.1485]
- Wyatt SD, Brown JK, 1996. Detection of subgroup III geminivirus isolates in leaf extracts by degenerate primers and polymerase chain reaction. *Phytopathology* **86**, 1288-1293. [doi:10.1094/Phyto-86-1288]



Figure 1



Figure 2

To cite this report: Kumari P, K Singh A, Chattopadhyay B, Chakraborty S, 2011. A new begomovirus species and betasatellite causing severe tomato leaf curl disease in Ranchi, India. *New Disease Reports* **23**, 11. [doi:10.5197/j.2044-0588.2011.023.011]

©2011 The Authors

This report was published on-line at www.ndrs.org.uk where high quality versions of the figures can be found.