Phylogenetic relationships, recombination analysis and genetic variability of Tomato yellow leaf curl virus infecting tomato in Jeddah, Saudi Arabia


Abstract:

Tomato (Solanum lycopersicum L.) production is severely affected by many diseases caused by many pathogens and among them viruses are the most serious pathogen. Begomoviruses causes yellow mosaic and leaf curl disease of tomato in the tropical, subtropical, temperate, and even semi-arid regions. Yellow leaf curl disease is caused by Tomato yellow leaf curl virus belonging to the genus Begomovirus of the family Geminiviridae. In this study, naturally infected tomato leaf samples were collected during field survey and causal virus was identified by PCR using tomato yellow leaf curl virus-specific primers and transmitted by whiteflies to healthy tomato seedlings. The full-length viral genome was amplified by rolling circle amplification technology while betasatellites from viral genome were amplified by PCR using universal betasatellites primers. The full-length viral genome (~2.7kb) and betasatellites (~1.4kb) were cloned and sequenced bi-directionally. The generated sequences were assembled and analyzed to find out the genetic variability by using bioinformatics tools and the genetic variability and phylogenetic relationships with selected begomoviruses were analyzed. The complete viral genome sequences showed highest (99.5%) similarity with an isolate of Tomato Yellow leaf curl virus-Jizan 103 isolate and 92.8% similarity with Tomato Yellow leaf curl virus-Egypt isolate. The newly identified virus formed the closest cluster with Tomato yellow leaf curl virus isolates from Jizan and Al-Qasim, Saudi Arabia. On the basis of sequence similarity and phylogenetic relationship and recombination analysis, it is concluded that the virus causing tomato yellow leaf curl disease is a variant of tomato yellow leaf curl virus either from Jizan or Al-Qasim isolate circulating in the Kingdom of Saudi Arabia.

Keywords:

Complete genome; Phylogenetic relationships; Recombination analysis; Tomato, Tomato Yellow leaf curl virus.

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