Title:

Tomato yellow leaf curl virus- IS76, a textbook case of viral emergence triggered by host shift

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Abstract body text:

Begomoviruses belong to the family Geminiviridae and are known to be highly recombinogenic. The tomato yellow leaf curl disease (TYLCD) is one of the most devastating disease affecting tomato. Various begomovirus species induce TYLCD all over the world including Tomato yellow leaf curl virus (TYLCV) and the tomato yellow leaf curl Sardinia virus (TYLCSV). TYLCV and TYLCSV are present in Mediterranean region and TYLCV/TYLCSV recombinants are frequently detected. TYLCD-resistant tomato plants bearing the Ty-1 resistance gene were deployed in this region; these plants accumulate about 10 times less virus than susceptible ones and are symptomless. In Morocco, where TYLCV and TYLCSV are detected since the end of the 90s, Ty-1 resistant plants have progressively replaced susceptible plants from 2003. However, in 2010, Ty-1 resistant plants exhibiting TYLCD symptoms were observed. They were infected with an unusual TYLCV/TYLCSV recombinant variant, TYLCV-IS76 (IS76). IS76 was not detected in tomato plants sampled before the deployment of Ty-1 resistant genotypes. After the deployment, IS76 was the only virus detected in tomato fields, while the parental viruses had nearly disappeared. Using infectious viral clones, the viral accumulation of IS76 was compared to that of parental viruses. IS76 accumulated at higher levels than parental viruses in Ty-1 resistant plants but at similar levels in susceptible plants. This result together with the coincidence between IS76 emergence and the deployment of Ty-1 resistant genotypes show that Ty-1 resistant plants triggered the emergence of the TYLCV-IS76 variant. Now, the challenge is to understand the molecular mechanisms that provide the selective advantage of IS76, and possibly derive from this knowledge the selection of new TYLCD-resistant genotypes.