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Reconstructing the emergence scenario of an invasive tomato begomovirus

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TYLCV-IS76, a recombinant between tomato yellow leaf curl virus (TYLCV) and tomato yellow leaf curl Sardinia virus (TYLCSV) was detected on symptomatic Ty-1-resistant tomato plants in 2010 in Southern Morocco. Field surveys showed that TYLCV-IS76 replaced parental viruses, and this coincided with the shift from susceptible to Ty-1-resistant cultivars. Co-inoculation of TYLCV-IS76 together with parental viruses showed that it is positively selected by Ty-1-resistant plants. However, the replacement dynamics of parental viruses by TYLCV-IS76 could not be monitored because of the lack of tomato sampling between 2004, when it was not detected yet, and 2012 when it had already replaced parental viruses. To reproduce the competition challenge that TYLCV-IS76 had to face to become dominant, its accumulation was monitored experimentally in conditions aiming at reproducing natural situations, i.e. superinfection of plants already infected with parental viruses. TYLCV-IS76 accumulated significantly more than parental viruses regardless of superinfection delays (1 and 4 months). The superinfected plants also contained TYLCV/TYLCSV recombinants automatically generated between TYLCV and TYLCSV. These other recombinants accumulated eventually more than parental viruses in plants co-infected with TYLCV and TYLCSV, but these recombinants accumulated significantly less than TYLCV-IS76 when they were co-inoculated with it using the whitefly vector, *Bemisia tabaci*. Intriguingly, although TYLCV-IS76 and the other recombinants both accumulated significantly more than parental viruses, TYLCV-IS76 was the only challenger to win the competition in fields.