A RECOMBINANT TOMATO YELLOW LEAF CURL VIRUS HAS REPLACED ITS PARENTAL VIRUSES IN SOUTHERN MOROCCO

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BACKGROUND and OBJECTIVES

Tomato yellow leaf curl virus (TYLCV) and Tomato yellow leaf curl Sardinia virus (TYLCSV) are two begomoviruses (Geminiviridae) which cause Tomato yellow leaf curl disease (Tylc) in the Mediterranean countries. The disease has been successfully managed from the end of the 90s with the use of cultivars bearing the tolerance gene Ty-1. In 2010, a new TYLCV/TYLCSV recombinant virus (IS76) was detected on tolerant plants exhibiting the typical Tylc symptoms in Souss, the region with the most intensive tomato production in southern Morocco. The prevalence of IS76 was determined with an intensive survey and its origin was inferred with Bayesian analysis.

MATERIAL & METHODS

As IS76 was not detectable with the tools previously reported to detect TYLCV/TYLCSV recombinants, a multiplex PCR test was designed to determine the infection status of each individual plant. A total of 800 tomato plant samples collected between 1998 and 2014 in the Souss and other tomato producing areas of Morocco were tested for the presence of the Mediterranean Tylc-associated viruses (TYLCV-IL, TYLCV-Mld, TYLCSV-ES) and potentially all TYLCV/TYLCSV recombinants. The date of IS76 recombination event was inferred with BEAST using Genbank sequences of TYLCV and sequences of TYLCV and IS76 generated in this study.

RESULTS

With a 76 nt TYLCSV inherited fragment, IS76 was identified to be different from the canonical TYLCV/TYLCSV recombinant previously reported [(1 & 2)]. It has virtually replaced its parental viruses, (TYLCV-IL, TYLCSV-ES) in the Souss between 2003 and 2012 and has spread northwards up to the Mediterranean coast of Morocco where it was detected in co-infection with parental viruses and canonical recombinants[(3)]. Its detection was not necessarily associated with Tylc symptoms, which was consistent with the fact that Ty-1 tolerant tomato plants remained symptomless following their infection with an infectious clone of IS76. According to phylogeny and Beast inference, the date of the recombination event leading to IS76 was most probably at the end of the 1990s and it emerged in the Souss region.

CONCLUSIONS

This is the first report of a TYLCV/TYLCSV recombinant virus that entirely displaced its parental viruses. As the population shift coincided with the increasing use of tolerant Ty-1 bearing cultivars in the Souss, it was suggested that these plants have positively selected the new recombinant. Drift was not the favored hypothesis because of year round tomato production. Studies to confirm the selective hypothesis IS76 and to explain why its peculiar recombination pattern has not been reported elsewhere are presented in the sister presentation of Z. Belabess.

REFERENCES

(1)**Garcia Andrès et al.,** Virology (2007), 365 p.210–219. (2)**Davino et al.,** Journal of General Virology (2012), 93, p.2712–2717.(3)**Belabess et al.,** Virology, (2015), 486, p.291–306.

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