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Characterization of the vector-mediated transmission of a betasatellite between different helper begomoviruses

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The knowledge of processes of spread of betasatellite is important to assess the risk of spread of these molecules in a begomovirus infected area. Betasatellites are circular single stranded DNA associated with begomoviruses (family Geminiviridae). They can increase the severity of viral symptoms and therefore, damage on crops. Betasatellites are replicated by the "helper" virus machinery, encapsidated in the viral capsid and transmitted, like the virus, by the whitefly Bemisia tabaci. They can be assisted by many geminiviruses and, as such, they represent a threat to crops in regions infested with begomoviruses but betasatellite-free, such as the Western Mediterranean Basin. Uncommon begomovirus/betasatellites associations have been reported and attributed to the vector transmission of a betasatellite without its original virus from a plant infected by a given begomovirus to a plant infected by another begomovirus. However the biological processes allowing such transfer of a betasatellite have not been characterized yet. The association between Cotton leaf curl Gezira virus (CLCuGeV) and Cotton leaf curl Gezira betasatellite (CLCuGeB) is widespread in okra crops in West Africa. In contrast, Tomato yellow leaf curl virus (TYLCV), the most widespread begomovirus in tomato crops of the Mediterranean Basin, is not commonly associated with betasatellites. Under natural conditions, Okra and tomato are not identified as hosts of TYLCV and CLCuGeV, respectively. Using vector transmission, we tested whether CLCuGeB could be maintained in TYLCV-infected tomato without the presence of CLCuGeV. We also tested if vectors could sequentially acquire CLCuGeV+CLCuGeB and TYLCV, and then transmit the different components to their respective host plant. In order to better characterize the influence of the vector and the host plants on the relative abundance of the different components, accumulation ratios of viruses and betasatellite are compared between infected plants and whiteflies.