Abstract

The causative agent of banana streak disease (BSD) is Banana streak virus (BSV). In tropical countries such as Kenya, the virus causes considerable damage to the banana crop besides lowering banana production yields. Several mealy-bug species have been reported as vectors of BSV. The latent and retention time of the BSV in the oleander mealy-bug (Paracoccus burnerae) is however unknown. The latent and retention times of viruses in disease vectors are important characteristics in the determination of the mode of transmission of viruses by their vectors. The purpose of this study was to determine the latent and retention time of the BSV in its vector, P. burnerae. We employed both the Immuno-capture Polymerase Chain Reaction (IC-PCR) and Rolling Circle Amplification (RCA) techniques to select diseased and healthy plantlets for transmission trials. RCA assays were performed on the deoxyribonucleic acid (DNA) samples of viruliferous mealy-bug instars of P. burnerae and on the DNA of virus-inoculated plantlets. The findings of the study indicated that BSV has no latent period in P. burnerae during transmission at ambient conditions (9-30°C). However, the vector can retain and transmit BSV for a period of four days under ambient temperatures (9-30°). The results revealed that the vector P. burnerae, transmits BSV semi-persistently which is an indication of a non-circulative mode of transmission of the virus. The results of this study contribute to the elucidation of the mode of transmission of BSV by P. burnerae and impetus for the development of novel control strategies of BSD. Further studies are recommended to determine the specific BSV and vector proteins involved in the transmission process. Such studies have the potential to contribute to development of novel disease management strategies based on the use of viral genes that encode for proteins that are defective to prevent vector inoculation and successful transmission of BSV by its vectors. From our results, we also recommend further screening studies for banana plant encoding molecules (e.g. peptides) that are able to bind to cuticle protein receptors in the vector mouthparts which may provide innovative virus management strategies by interfering with the process of virus retention.