



Morphological, genetic and biological characterisation of a novel *alphabaculovirus* isolated from *Cryptophlebia peltastica* (Lepidoptera: Tortricidae)

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ABSTRACT

Cryptophlebia peltastica is an agricultural pest of litchis and macadamias in South Africa with phytosanitary status for certain markets. Current control methods rely on chemical, cultural and classical biological control. However, a microbial control option has not been developed. An *Alphabaculovirus* from *C. peltastica* was recovered from a laboratory reared colony and morphologically characterised by transmission electron microscopy (TEM). Analysis of occlusion bodies indicated a single NPV (SNPV) varying in size from 421 to 1263 nm. PCR amplification and sequencing of the *polh* gene region using universal primers followed by BLAST analysis revealed a 93% similarity to a partial *polh* gene sequence from *Epinotia granitalis* NPV. Further genetic characterisation involving single restriction endonuclease (REN) digestion of genomic DNA was carried out to generate profiles for comparison against other baculovirus species and potential new isolates of the same virus. The complete genome of the virus was sequenced, assembled and analysed for a more comprehensive genetic analysis. The genome was 115 728 base pairs (bp) in length with a GC content of 37.2%. A total of 126 open reading frames (ORFs) were identified with minimal overlap and no preference in orientation. Bioassays were used to determine the virulence of the NPV against *C. peltastica*. The NPV was virulent against *C. peltastica* with an LC₅₀ value of 6.46×10^3 OBs/ml and an LC₉₀ value of 2.46×10^5 OBs/ml, and time mortality ranging between 76.32 h and 93.49 h. This is the first study to describe the isolation and genetic characterisation of a novel SNPV from *C. peltastica*, which has potential for development into a biopesticide for the control of this pest in South Africa.

1. Introduction

Cryptophlebia peltastica (Meyrick) (1921) (Lepidoptera: Tortricidae), is an important economic pest of litchi and macadamia in South Africa, Mauritius, Seychelles, Réunion Island and Madagascar (Follet and Lower, 2000; Waite and Hwang, 2002; Mankrakhan et al., 2008) and is considered a phytosanitary risk for certain export markets, reducing overall profits (de Villiers, 1992). Multiple control options are used in an integrated pest management (IPM) programme against *C. peltastica* to improve crop yields and ensure market access (Booyesen et al., 2006; de Villiers, 1992; Schoeman et al., 2009). The IPM programme includes

chemical control, which involves the application of two registered chitin synthesis inhibitor insecticides, triflumuron and teflubenzuron (e.g. Alsystin 480 SC (Bayer, Germany) and Nomolt 150 SC (BASF, Germany), respectively) (de Villiers, 1992; Grove, 2000). Only the latter is currently available, and residue restrictions in export markets limit the usability of these products. Cultural control consists of orchard sanitation and fruit bagging (brown paper bags known as Birdspun (Plastrip cc, South Africa) (Grové et al., 2005; van den Berg and Joubert, 2010). Biological control involves the use of an egg parasitoid, in the genus *Trichogrammatoidea* (Booyesen et al., 2006; de Villiers, 1992; Schoeman et al., 2009). A method that has not yet been

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