

A NUCLEAR POLYHEDROSIS VIRUS OF *HYPOSIDRA TALACA* (WALKER)

Oleh:

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Intisari

Suatu virus polihedrosis inti (NPV) telah diisolasi dari ulat *Hyposidra talaca* (Lepidoptera: Geometridae) yang hampir mati dari Jawa Tengah. Ukuran diameter rata-rata polihedra tersebut adalah 0,8 μm , sedangkan ukuran rata-rata nukleokapsid yang berbentuk batang yang dimurnikan dari polihedra adalah panjang 359 nm dengan lebar 54 nm.

Abstract

A nuclear polyhedrosis virus was isolated from moribund loopers of *Hyposidra talaca* (Lepidoptera: Geometridae) in Central Java. The average size of polyhedra was 0.8 μm in diameter. The average size of rod-shaped nucleocapsids purified from polyhedra was 359 nm in length and 54 nm in width.

Introduction

Nuclear polyhedrosis viruses (NPVs) have been successfully used in biological control of several insect pests (Maramorosch and Sherman, 1985). The viruses belong to the subfamily Eubaculovirinae of the family Baculoviridae (Francki et al., 1991). Virions consist of one or more rod-shaped nucleocapsids enclosed within a single envelope.

Hyposidra talaca is a common and polyphagous caterpillar of various woody plants and distributed throughout South-East Asia (Kalshoven, 1981). This work was undertaken under the JSPS-DGHE program on biological control in sustainable tropical agriculture to assess ecologically the effect of specific control agents on the insect population in a tea plantation owned by Pagilaran Co., Batang, Pekalongan.

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Materials and Methods

Dead or diseased *Hyposidra* loopers on tea trees were collected and diagnosed microscopically as follows. Their internal tissues were placed in a drop of water on a slide glass and slightly pressed with a cover glass. The wet-mount preparations were examined under the objective lense (x20 or x40) of an ordinary light microscope to determine the presence of characteristic occlusion bodies, or polyhedra.

Polyhedra were purified from the cadavers of infected loopers by differential centrifugations in distilled water. For virus purification, polyhedra were dissolved in 0.1M glycine buffer (pH 12) for 30 min. The resulting suspension was overlaid on 20% w/w sucrose and centrifuged for 60 min at 60,000g. The pellet was suspended in distilled water and subjected to differential centrifugations for 10 min at 4,500g and for 60 min at 40,000g. The final pellet was suspended in a small amount (ca 0.1 ml) of distilled water. This preparation or purified polyhedra was placed on grids covered with a Formvar membrane, stained with 3% uranyl acetate and examined with JEM 100C electron microscope at 100 kV.

Results and Discussion

On August 25, 1993, two moribund loopers were collected from tea trees during a survey of diseased insects in a tea plantation. They hanged with their legs attached to the branches. Their skins were fragile and the liquefied internal contents oozed out from the wound produced by even a gentle touch (Fig. 1). Light-microscope examination of the insect tissues revealed the presence of polyhedra in the nuclei of the fat body, tracheal matrix and blood cells. The polyhedra ranged from 0.6 to 1.2 microns in diameter and averaged 0.8 microns. These are the typical signs of nuclear polyhedrosis.

On the next day, we surveyed another district of the same plantation, Andong Sili, where the insect had been more abundant in the preceding years, and found a tea tree which was infested with approximately 60 fully-grown loopers. All of them showed outward signs of NPV infection. When trees in the surrounding area of about 1 hectar were examined, only six of them, or approximately 0.3%, were heavily infested with NPV-infected loopers. Other trees were little damaged by the loopers.

These results indicated that there was heavy damage in trees where egg clusters were deposited and that the high larval density favored the horizontal virus transmission, which resulted in high incidence of NPV infection.



Fig. 1. *Hyposidra talaca* looper dead of nuclear polyhedrosis on a tea twig.

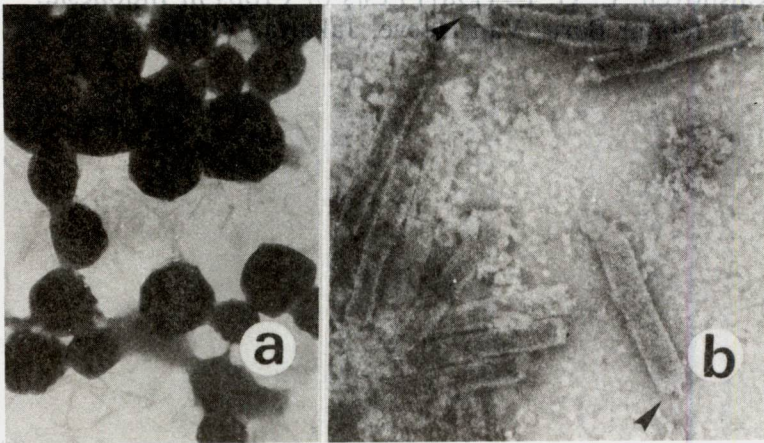


Fig. 2. Electron micrographs of a nuclear polyhedrosis virus of *Hyposidra talaca*. (a) Purified polyhedra. 13,000x. (b) Negatively stained nucleocapsids. Note the presence of a nipple-like structure on one end (arrowhead). 72,600x.

Electron microscopy of purified polyhedra revealed that some of them had been partially dissolved during storage presumably due to the action of alkaline gut juice (Fig. 2a). Virus preparations obtained from solubilized polyhedra revealed the presence of a large number of rod-shaped nucleocapsids (Fig. 2b). The average size and standard error of 10 nucleocapsids were as follows: length, 359 ± 27 nm; width, 54 ± 5 nm.

This is the first record of a nuclear polyhedrosis of this insect. Biological control of insect pests of tea plantations is all the more important because the use of chemical insecticides is restricted on account of safety consideration.

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