

Natural Occurrence of a Baculovirus Disease in *Oryctes rhinoceros* (L.) Population in Tamil Nadu

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ABSTRACT

Grubs and adults of *O. rhinoceros* collected from coconut gardens in Pollachi taluk were subjected to visual and microscopical examination for detecting the natural incidence of baculovirus disease. The observations revealed the presence of disease in the midgut epithelial tissue of the host. The scope of utilising the natural incidence for biological control of this important pest in coconut is discussed.

Key words: Baculovirus, *Oryctes rhinoceros*, natural occurrence

The coconut rhinoceros beetle *Oryctes rhinoceros* (L.) is one of the important pests of the coconut palm. In Pollachi taluk (Dist. Coimbatore) of Tamil Nadu where coconut is extensively grown, the pest damage was observed in more than 90% of the gardens, the degree of infestation ranging from 3.5% to 30% in the different gardens surveyed. But the cultivators do not pay much attention to take up control measures as a result, the pest multiplies and causes significant damage.

A novel and efficient method of control is the use of the baculovirus, which was discovered first in Malaysia and described as *Rhabdionvirus oryctes* (Huger, 1966). Natural occurrence of the baculovirus in the rhinoceros beetle has been reported from the Philippines and Indonesia (Zelazny, 1977). The virus was first introduced into Western Samoa in 1967 (Marshall, 1970) for the biological control of rhinoceros beetle and the virus disease rapidly spread resulting in a marked fall in the pest population. In India, the virus was detected in Kerala (Mohan *et al.*, 1983). However, the natural occurrence of baculovirus disease has not been reported from the other States of India. Hence a survey was undertaken at the Agricultural Research Station, Aliyarnagar, Tamil Nadu, to study the occurrence of the baculovirus in *O. rhinoceros* population with a view to using it for the biological control of the pest. The survey is the first of its kind in Tamil Nadu.

MATERIALS AND METHODS

O. rhinoceros grubs and adult beetles were collected from breeding sites and from the infested crowns of 7-14 years old coconut palms in 20 villages of Pollachi taluk of Coimbatore district. The

grubs and beetles were dissected immediately after collection for visual examination.

The presence of baculovirus disease in the grubs and beetles was diagnosed by visual examination of the midgut and its contents (Zelazny, 1978), as well as examination of Giemsa-stained smear of midgut contents. Air-dried smears of midgut contents drawn from dissected grubs and beetles using tuberculin syringe and 18 gauge needle were fixed in methanol for 5 minutes, stained with Giemsa's for one hour and finally rinsed in distilled water and examined under oil immersion.

RESULTS AND DISCUSSION

Out of the 203 larvae examined, 140 appeared lethargic and slow in feeding. Their body was partially translucent and waxy in appearance especially in the thoracic region. The body of these grubs was soft and supple as compared to healthy larvae which had a slightly rigid body. Mohan *et al.* (1983) described the appearance of midguts of acutely infected grubs and beetles to be white, swollen and filled with mucoid milky fluid containing flakes of cellular debris. It was also reported that these visual lead symptoms may be partially or totally absent in early stages of infection. In the present study, the body of the beetles was white, slightly swollen and partially filled with mucoid fluid which indicated early to middle stage of disease in the beetle.

Giemsa stained smears of diseased midgut, contained large clumps of cells with purple stained hypertrophied nuclei and sparse blue cytoplasm. A few infected nuclei were also irregular in shape.

Table 1. Natural occurrence of baculovirus disease in *Oryctes rhinoceros* grubs and beetles in Pollachi tract of Tamil Nadu

Village	Visual method	Smear method	Frequency of occurrence		Inference
			Grubs	Beetles	
Aliyamagar	D	+	20	10	Diseased
Angalakurichi	D	+	10	5	Diseased
Avalsinnampalayam	-	+	6	4	Diseased
Chinnasalai	-	-	15	10	Healthy
Divanshapudur	D	+	5	3	Diseased
Ganapathypalayam	D	+	15	7	Diseased
Govindapuram	-	+	8	2	Diseased
Jaminuthukuli	-	+	2	3	Diseased
Kottur	-	+	14	6	Diseased
Kizhavanpudur	D	+	15	5	Diseased
Manakadavu	-	-	12	6	Healthy
Marappagoundanpudur	-	+	4	5	Diseased
Meenakshipuram	-	-	17	4	Healthy
Muthur	D	+	5	3	Diseased
Pilsinnampalayam	-	-	13	7	Healthy
Periachalai	-	-	6	3	Healthy
Periyakombu	D	+	10	3	Diseased
Periyapodu	D	+	3	2	Diseased
Siddhagoundanpudur	-	+	7	3	Diseased
Samathur	D	+	5	2	Diseased
Upper Aliyar	D	+	11	7	Diseased
Total			203	100	

D = Doubtful symptoms

+ = Present

- = Absent

This suggested derangement of the host nuclei and transformation of nucleoplasm into viroplasm. In contrast, the healthy nuclei were smaller, well defined and had purple stained chromatin network surrounded by blue cytoplasm.

The results of visual symptoms and smear test in grubs and beetles examined in the present study are given in table 1. Out of the 203 grubs and 100 beetles dissected, 140 grubs and 70 beetles were found to have early to middle stage of baculovirus infection. Out of the 140 grubs and 70 beetles inferred as diseased (Table 1), 70.71% of midguts (99/140) of grubs and 67.14% of midguts (47/70) of beetles showed partial visual signs of infection, designated as "doubtful". Nevertheless, with the inherent shortcomings, the visual symptoms could be considered to be a quick indicator of baculovirus infection (Zelazny, 1978). Mohan *et al.* (1983) reported that out of the five diagnostic methods (visual examination of midgut, smear of midgut contents, Immunoosmophoresis (IOP), bioassay and electron microscopy), examination of midgut

smear and IOP had proved to be ideal for screening of large number of grubs and beetles for assessing the natural incidence, in view of their high degree of reliability and rapidity. From the table it can be inferred that the percentage of incidence of baculovirus disease was more in and around Aliyam-nagar and also in Ganapathypalayam and Kizhavanpudur villages in Pollachi tract. Since the natural occurrence is in the early and middle stages of infection, it may not be adequate for use in the biological control. However, mass culture and release of baculovirus infected adults will be helpful to bring down the population of this important pest substantially and achieve pest control. Hence artificially inoculated adult beetles were released in isolated pockets for accomplishing biological control.

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